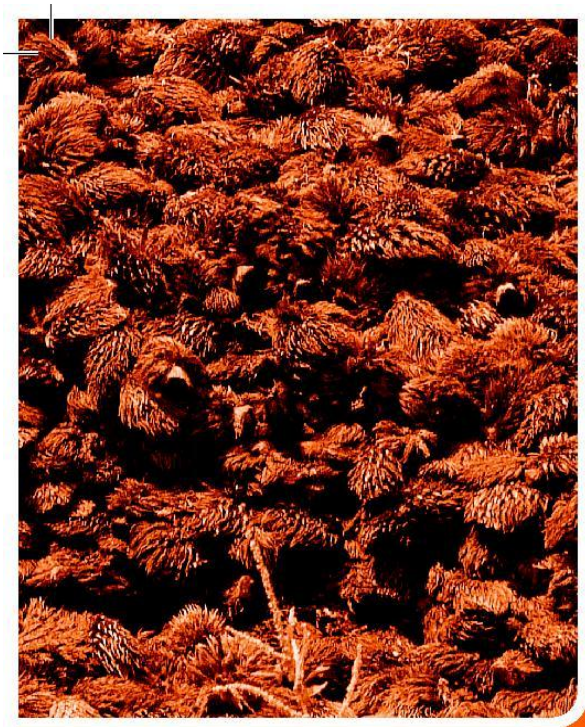
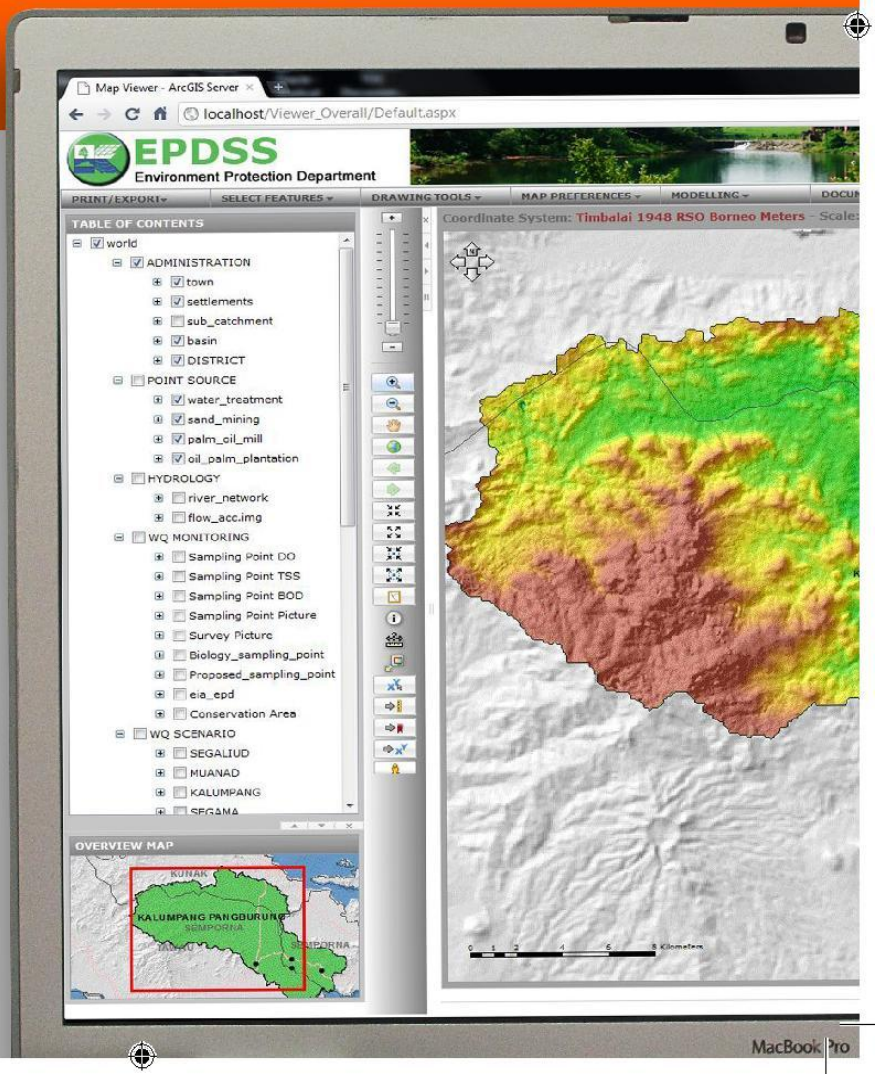


ENVIRONMENT PROTECTION DEPARTMENT
MINISTRY OF TOURISM, CULTURE AND
ENVIRONMENT, SABAH

Impact Study of Palm Oil Mills, Oil Palm Plantations and other Pollutants on the Quality of Selected Rivers in Sabah

August 2011



Environment Protection Decision Support System (EPDSS) User Manual

ENVSOLVE SDN BHD

IMPACT STUDY OF PALM OIL MILLS, OIL PALM PLANTATIONS AND OTHER POLLUTANTS ON THE QUALITY OF SELECTED RIVERS IN SABAH

ENVIRONMENT PROTECTION DECISION SUPPORT SYSTEM (EPDSS) USER MANUAL

Project No. : Envsolve/4/01/145/FR/11
Issue Date : August 2011

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1 INTRODUCTION TO THE EPDSS

The Environment Protection Decision Support System (EPDSS) was developed as a tool to assist in managing the water quality of Sg. Muanad, Sg. Kalumpang,Sg. Pang Burong, Sg Segaliud and Sg. Segama. It integrates Geographical Information System (GIS) with water quality model using a loose coupling method. The EPDSS was developed using the ArcGIS 10 platform with the DotNet Framework and QUAL2K Water Quality Modeling Software.

The system consists of data, models and 'point-and-click' interfaces that connect users directly with the water quality data and model. The EPDSS has tools which enable decision-makers to manipulate important parameters to answers to a variety of questions based on "what if" scenarios in water quality management.

2 OBJECTIVE OF THE EPDSS

The objectives of the EPDSS are to develop a user-friendly Decision Support System (DSS) for decision maker in monitoring and planning the study area.

3 SCOPE

The scope for the Decision Support System is:

- To facilitate easy access by government officer to spatial data correlating to point sources and non-point sources
- Database integration with raw models data related to maps, documents and picture
- Integrated data with generated Qual2k
- Provide web base to selected data information

4 CAPABILITIES OF THE EPDSS

The EPDSS enables users to conduct the following tasks:

- Visualise data – view geographical and environmental data
- Produce thematic maps for pollution loading
- View water quality indices of the various stretches of Sg. Muanad, Sg.Kalumpang Pang Burong, Sg Segaliud and Sg. Segama
- Map various points of pollution sources and hyperlink the points to photographs and inventory reports
- Retrieve information on strategies and interventions
- Run the QUAL2K water quality model and display the outputs
- View the report and GIS map layout
- Conduct queries on point sources

5 EPDSS REQUIREMENT

5.1 SOFTWARE REQUIREMENT

5.1.1 ARCGIS SERVER

The ArcGIS is the main platform for the EPDSS. ArcGIS Server is the core server geographic information system (GIS) software made by Esri. ArcGIS Server is used for creating and managing GIS Web services, applications, and data. ArcGIS Server is typically deployed on-premises within the organization's service-orientated architecture (SOA) or off-premises in a cloud computing environment.

5.1.2 QUAL2K

QUAL2K is a river and stream water quality model which simulates the water quality. It is used to assess the environmental impact of multiple pollution discharges along rivers. It is programmed in the Windows macro language using Visual Basic for Applications (VBA). MS-Excel is used as the graphical user interface. QUAL2K is a freeware from the Ecosystems Research Division of the U.S. Environmental Protection Agency. It is provided together with the EPDSS.

It can also be downloaded from:

http://www.epa.gov/ATHENS/wwqtsc/html/qual2k.html.

5.1.3 ACROBAT READER

Acrobat Reader is used to view, navigate, browse, and print portable document format (PDF) files that have been created by Adobe Acrobat. This freeware is provided together with the EPDSS. It can also be downloaded from: http://www.official-downloads.com/acrobat/

The EPDSS is run within the Microsoft Windows environment.

5.1.4 SUPPORTED OPERATING SYSTEM

The operating systems below satisfy the minimum operating system requirements:

- Windows 2003 Service Pack 2 Server Standard, Enterprise & Datacenter (32-bit and 64-bit (EM64T)
- Windows 2008 Server Standard, Enterprise & Datacenter (32-bit and 64-bit (EM64T)
- Windows 2008 R2 Server Standard, Enterprise & Datacenter (64-bit (EM64T)
- Windows 7 Ultimate, Professional Edition (32-bit and 64-bit (EM64T)
- Windows Vista Service Pack 1 Ultimate, Enterprise, Business (32-bit and 64-bit (EM64T)
- Windows XP Service Pack 3 Professional Edition (32-bit)
- Windows XP Service Pack 2 Professional Edition (64-bit (EM64T)

5.2 HARDWARE REQUIREMENT

The EPDSS is designed to enable personal computers to access the System from the EPDSS's Server. The minimum hardware requirements for the client are described in the table below.

Table 5.1: Minimum Hardware Requirements for Client

Platform	Windows
Operating System	Windows 2000, Windows XP (Home Edition and Professional), Windows Vista, Windows 7
Memory	512 MB RAM
Processor	1 Ghz

Table 5.2: Minimum Hardware Requirements for Server

Platform	Windows
Operating System	Windows Server 2008
Memory	4 GB RAM and above
Processor	Xeon

5.3 SKILL REQUIREMENT

A basic working knowledge of Internet Browser, GIS and the QUAL2K software is required.

6 SYSTEM ARCHITECTURE

6.1 DESIGNING THE ARCHITECTURE

The design and structure of the EPDSS is focused on simplifying functionality by providing tools that enable the user to interact with the system effectively.

A system architecture or *systems architecture* is the conceptual model that defines the structure and/or behavior of a system.

An architecture description is a formal description of a system, organized in a way that supports reasoning about the structural properties of the system. It defines the system components or building blocks and provides a plan from which products can be procured, and systems developed, that will work together to implement the overall system. This may enable one to manage investment in a way that meets business needs. The language for architecture description and representation is called the architecture description language (ADL).

Below is the system architecture for the EPDSS.

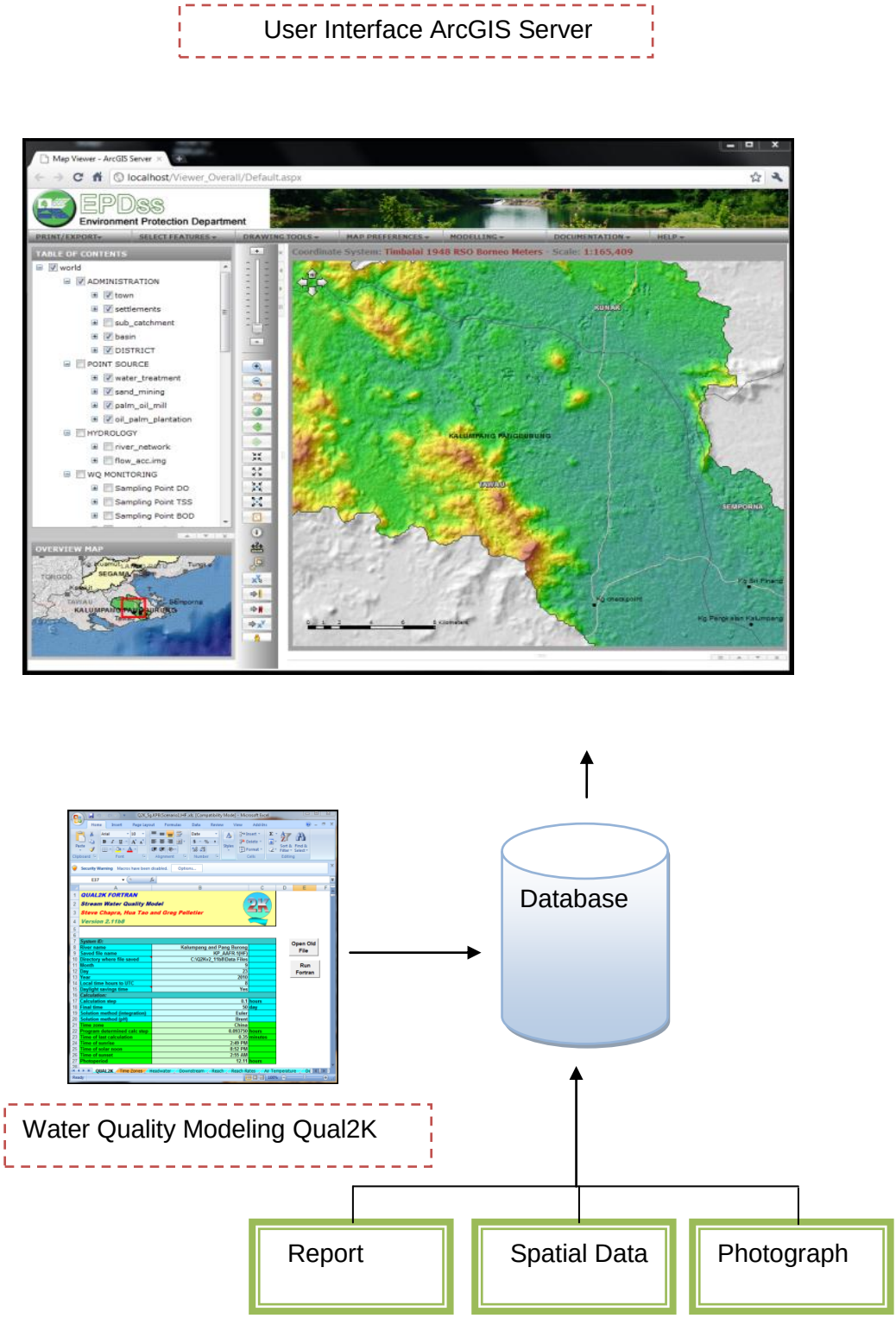


Figure 6.1: Schematic representation of the EPDSS

6.1.1 ARCHITECTURE DESIGN

Systems design is the process or art of defining the architecture, components, modules, interfaces, and data for a system to satisfy specified requirements. One could see it as the application

of systems theory to product development. There is some overlap with the disciplines of systems analysis, systems architecture and systems engineering.

a) Logical design

The logical design of a system pertains to an abstract representation of the data flows, inputs and outputs of the system. This is often conducted via modelling, which involves a simplistic (and sometimes graphical) representation of an actual system. In the context of systems design, modelling can undertake the following forms, including:

b) Data flow diagrams

The design illustrated below show the interaction between Geographical Information System, GIS Web Application and Qual2K.

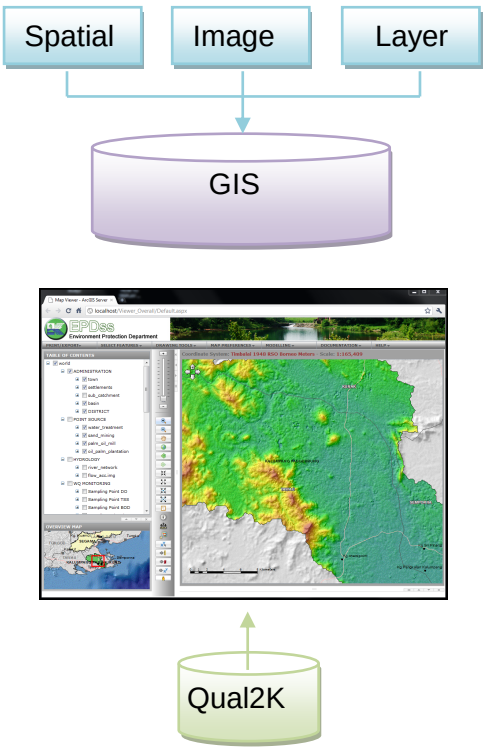


Figure 6.2: Data flow diagram representation of the EPDSS

c) Components of an ArcGIS Server System

The ArcGIS family of products--ArcGIS Desktop, ArcGIS Engine, and ArcGIS Server--are all built from ArcObjects. Casual users of ArcGIS Desktop are probably not aware of, nor do they care about ArcObjects. They simply run Arc Map, for example, and edit their map. It isnot until they want to start customizing ArcGIS Desktop or building their own applications that they become more familiar with ArcObjects.

The main difference between running a desktop application and one based on a GIS server is in where the ArcObjects components reside. For desktop applications, the objects needed for the application are instantiated and run in the application itself on the local machine. For instance, when you start ArcMap and open a map document, the ArcMap application instantiates the objects that allow you to draw the map, add layers, edit the layout, and so on. Essentially, all the objects stored in the map document are rehydrated for use during that ArcMap session. When you save the map, the current state of the objects used during the session is written to the map document for later use.

Unlike desktop applications, clients of a GIS server-based application access the ArcObjects components remotely. You can think of your GIS server as the container that hosts the objects for all client applications that need to use them in much the same way an ArcMap session hosts the objects for an individual user. However, with the GIS server, objects are shared between clients. Because of this, the way clients use the GIS resources running on the server is a little different. When you create an application that accesses a GIS server, you need to follow the prescribed coding guidelines for accessing the objects running on the server. These guidelines are presented and described in the Developer Help system.

If you are familiar with ArcGIS Desktop, then you are also familiar with the GIS resources you work with in the desktop environment. For example, if you want to display your GIS data, you do so through maps and globes. If you want to find locations by their

address, you use an address locator. If you want to do some analysis, you use the geoprocessing tools in the toolbox. Each of these items encapsulates some level of GIS functionality. Fundamentally, the GIS functionality is exposed through a specific set of ArcObjects components that implement the functionality.

On the GIS server, instead of working with, for instance, map documents, globe documents, and address locators, you work with map services, globe services, and geocode services. GIS resources that have been made available on the server are collectively referred to as services. Actually, you'll still use map documents, globe documents, and address locators, as these are the sources for the services you host on the GIS server. Thus, if you want to share a map you have made on the GIS server, you use the map document to define the map service that runs on the server.

The main purpose of a GIS server is to host services and distribute them to client applications that need to use them. Additionally, the GIS server provides a set of tools that allow you to manage the services; for example, you can use the ArcGIS Server Manager application to add and remove services.

It's useful to understand how a GIS server system is put together so that you can build applications that effectively utilize ArcObjects running in a server environment. This section serves as an introduction to the components that compose a GIS server.

The following diagram shows the ArcGIS Server system architecture.

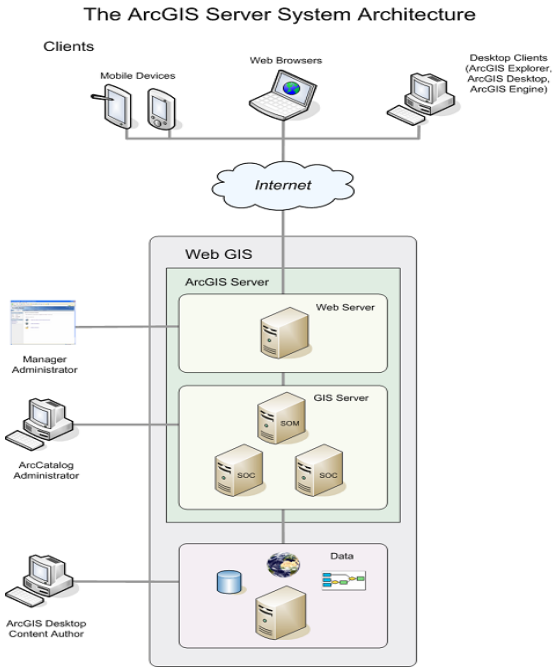


Figure 6.3: ArcGIS Server system architecture representation of the EPDSS

6.2 METHODOLOGY

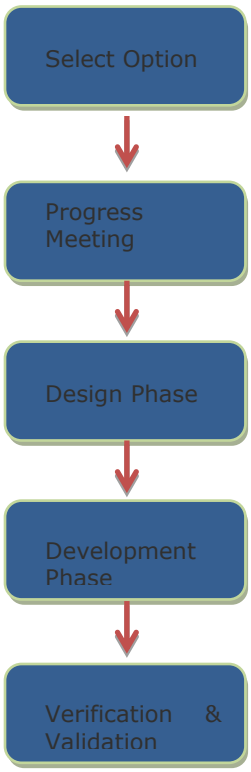


Figure 6.4: ArcGIS Server system architecture representation of the EPDSS

6.2.1 OPTION SELECTION

Table 6.1: Option selection

NO	Options	Description
1	Stand alone or desktop application	Using ArcGIS Platform
2	Web-application without Modelling	Use Open Source: Mapguide Use for Data Sharing and Retriving
3	Web-application with modeling capability	Use ArcGIS Server with Qual2K. Use for Data Sharing, Retreving and Water Quality Analysis

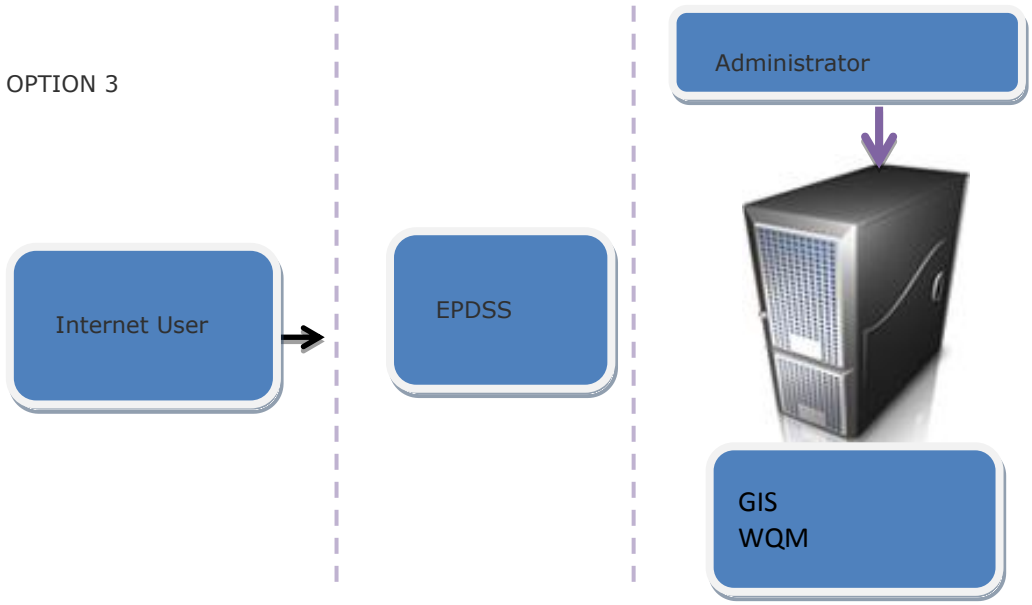


Figure 6.5: Option 3 chosen by EPD

6.3 DATA STRUCTURE

There are nine elements (Figure 6-6) in the EPDSS, namely:

- Base Map
- Administration Boundary
- Land Use
- Water Quality
- Water Supply & Resources
- River Management
- Biological and Environment
- Geographic Features
- Analysis Data

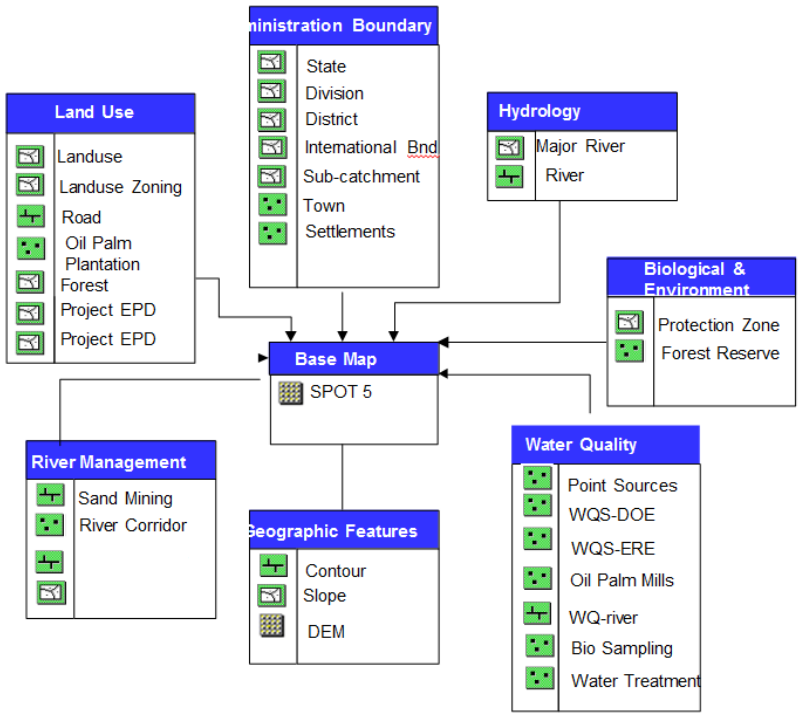


Figure 6.6: Data structure representation of the EPDSS

6.4 USER INTERFACE

The EPDSS was developed as an extension component which can be retrieved by using Internet Explorer.By default, the main interface is divided into three components, namely the Table of Contents (TOC) on the left, Toolbar on the top and Viewer at the centre. When loaded, the interface bar of the EPDSS can be moved by 'drag-and-drop' or toggling around the ArcGIS environment. The overall user interface of the EPDSS in ArcGIS platform is shown in **Figures 6-7.**

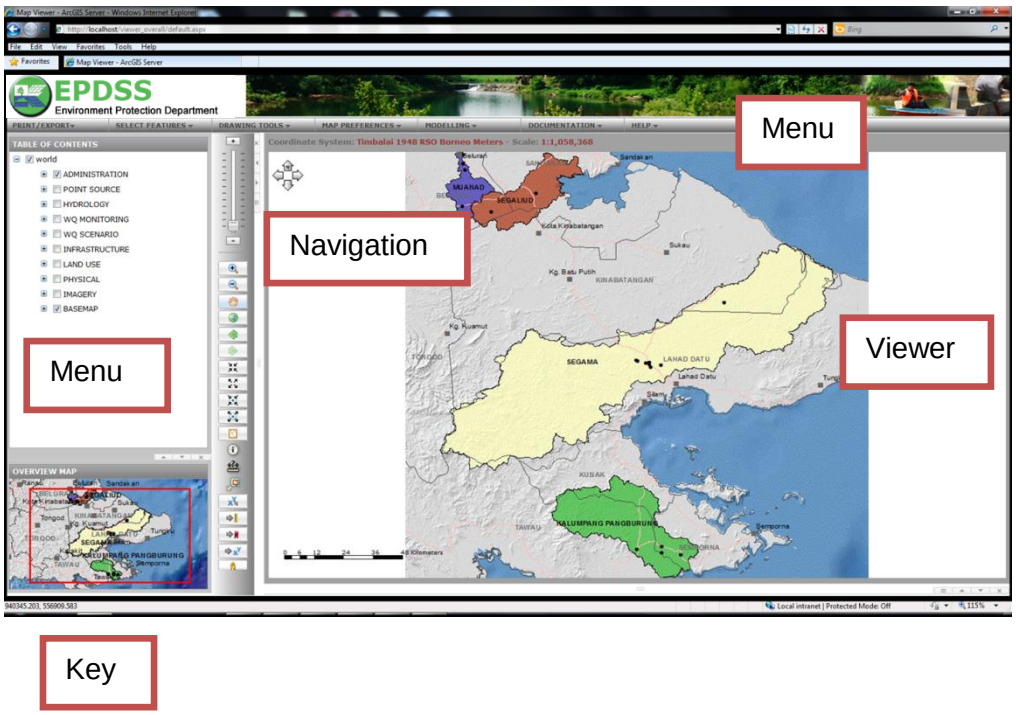


Figure 6.7: EPDSS Interface

This menu bar allows access to all related information and modeling for EPDss study. The toolbar is a dropdown menu which you can hover and the menus will dropdown.

The grouping menu illustrates the functionalities of each menu so that you have a choice in retrieving the information.

Table 6.2: Functionality

No	Functionality	Description
1	Map	Used for printing map
2	View	Used to control the user interface
3	Selection	Tool for simple analysis
4	Tools	Used to add temporary graphic
5	Preference	Used to control the selection option
6	Modeling	DSS Modeling
7	Documentation	Used to link all related documentation

The detail of grouping by pull down menu as below:

Table 6.3: Menu

Map	View	Selection	Tools	Preference	Modelling	Documentation
Print	Accordian Menu	Select by Attribute	Draw graphic	Set Map refresh rate	Select case study	
Export	Result Menu	Select by feature buffer	Draw label	Set selection symbols	Open Qual2K	
	Overview	Select by point buffer	Draw shape			
		Select by location	Measure			
			Magnifier			

7 EPDSS FUNCTIONALITY

There are various components in the EPDSS interface. As described earlier, the EPDSS was created as an extension built in ArcGIS Server 10 environment. Thus, the capabilities of the core platform also support and enhance the functionality of the EPDSS. This report focuses on the general functionalities of the EPDSS whereas the detailed step-by-step instructions are provided in the User Manual (see **Section 4**)**.**

7.1 DATA VISUALISATION AND NAVIGATION

The basic functionalities of the EPDSS are data visualisation and navigation through a simple data retrieval format. There are several types of information in the EPDSS:

- Spatial Data
- Information/Tabular
- Reports

The entire data menu is arranged such that a user only needs to select any data or document for it to be displayed. This simplifies the process of retrieving data or documents from the directories. For spatial data retrieval, a user needs to select an individual layer/data in the Database menu to display in the Viewer.

For example, the user can choose to display individual layers such sub-catchments in the group of Administrative elements **(Figure 7.1).**

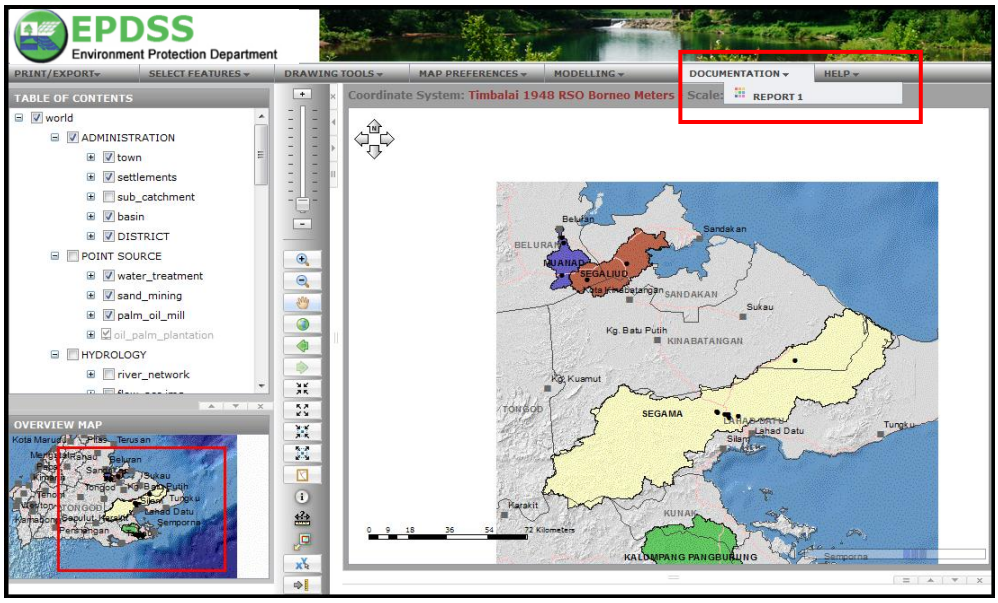


Figure 7.1: Data Retrieval Menu

The main viewer allows the user to view the various geographical data in the database and display them thematically. Together with the data is the legend which will appear in Table of Content (TOC) once the data is displayed. The legend is based on selected information stored in the data layers.

The information tool provided in the navigation toolbar enables users to access information by selecting the feature. All the stored information is displayed in a separate window-pane. This data retrieval function includes search features or information within the data layers.

The user is able to navigate the data using tools on the toolbar such as zoom-in and out, pan, select, get information, measure and find which is embedded in the system. Apart from that, the user can also navigate the information stored in layers by opening its attributes.

7.2 MONITORING ACTIVITIES

The user can retrieve information on pollution sources and water quality characteristics through the Monitoring menu. In this system, the monitoring aspect for pollution sources is focused on existing point sources **(Figure 7.2).**

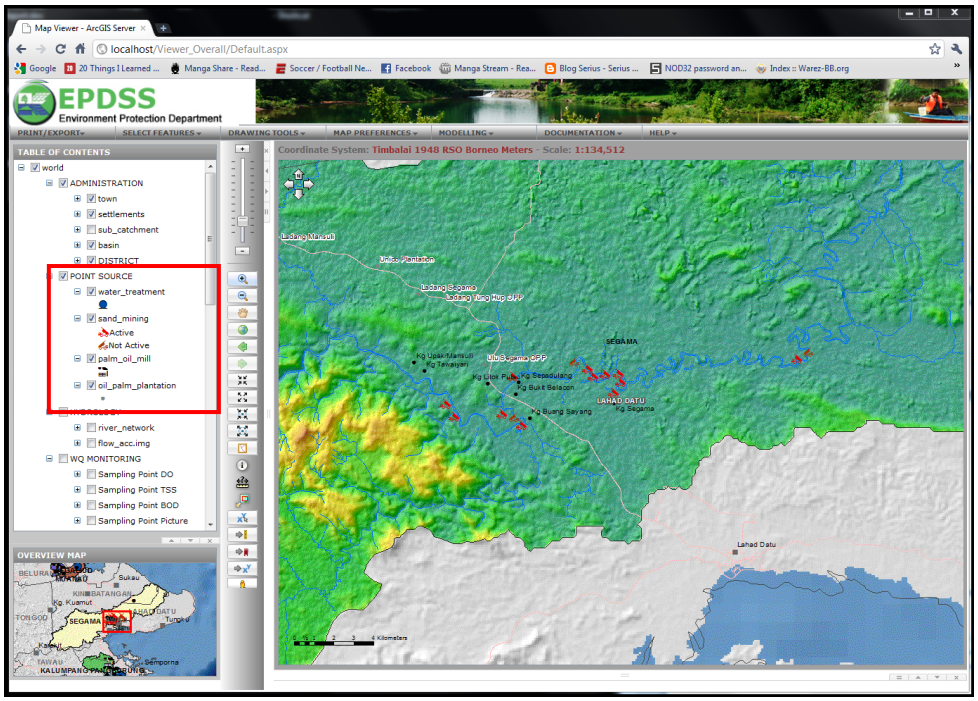


Figure 7.2: Monitoring Menu and Functionalities

To assist the user in getting detailed information on point sources, photographs can be uploaded with the information. These photographs are linked to the data and users can select the particular point source **(Figure 7.2)**.

The EPDSS also provides a *Find* function to locate any data or features in the database. For example, a user may want to locate the palm oil mill named *Abedon. The Find* tool locates the point source and opens the information and photograph. Figure 7-2 shows the retrieved information and the hyperlinked photograph of the point source. With this combination, retrieving information can be quick and easy and navigation to find pollution source information is also simple.

Besides this functionality, the EPDSS also provides access to the inventory report for each point source. This inventory report is generated using 'crystal report' (provided by ArcGIS) and stored in PDF. All the information regarding a point source has been simplified to fit into one page **(Figure 7.1)**.

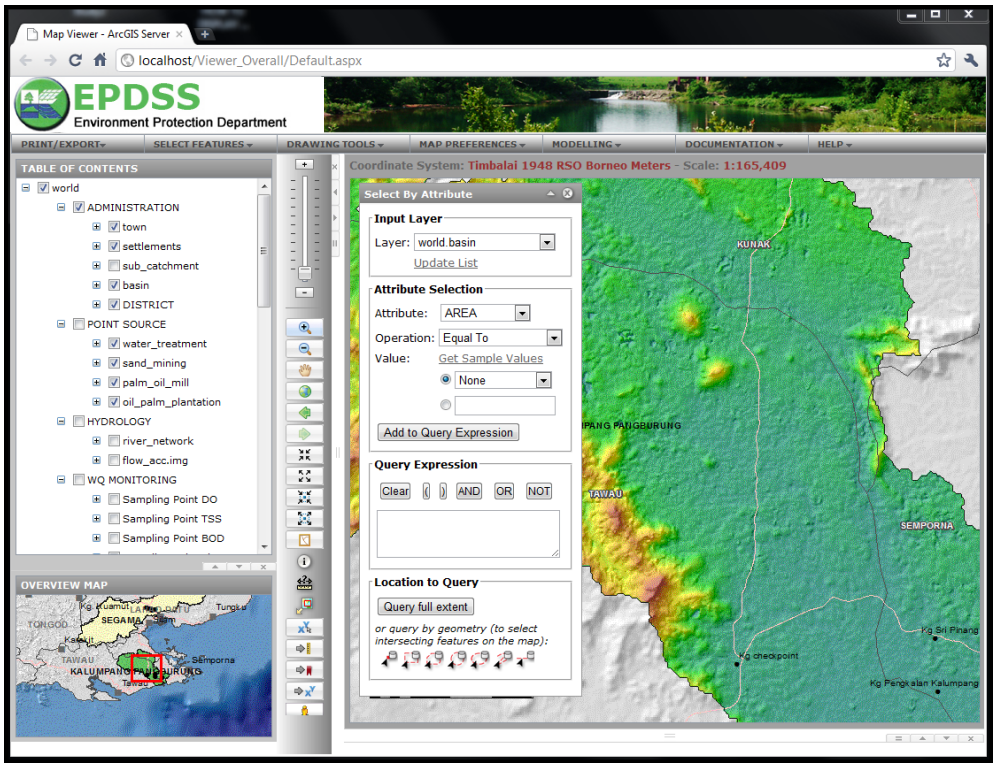


Figure 7.3: Retrieved Information

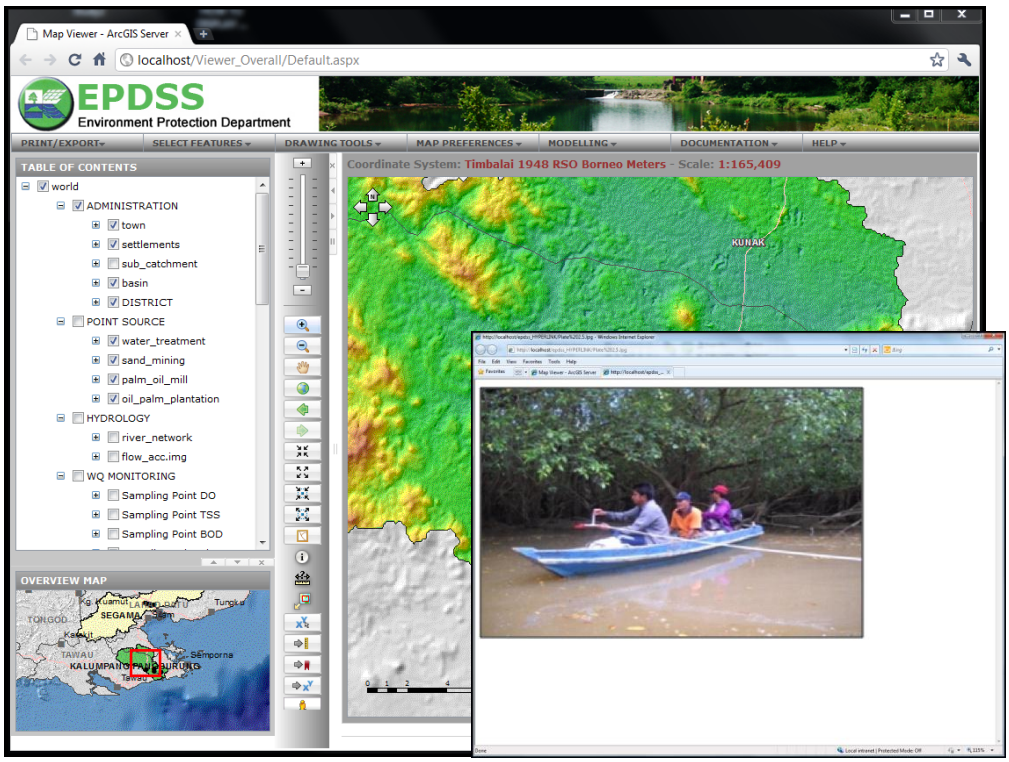


Figure 7.4: Hyperlink to Photograph

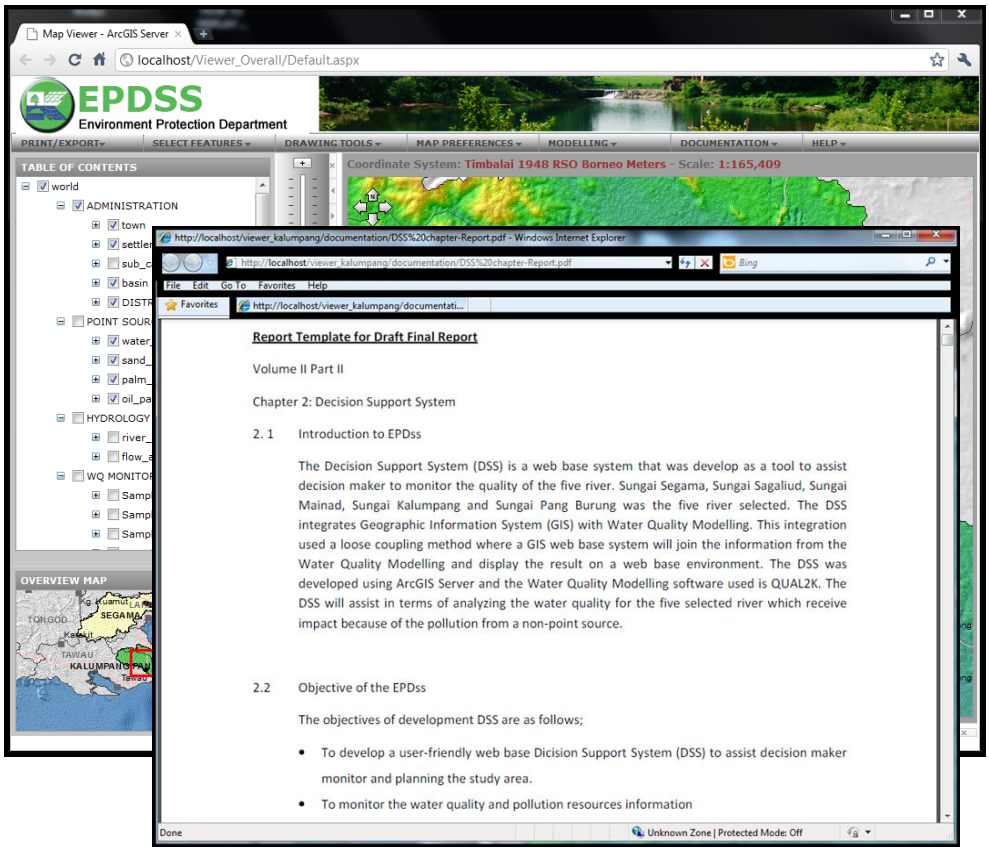

Map Viewer - ArcGIS Server
localhost/Viewer_Overall/Default.aspx
EPDSS
Environment Protection Department
PRINT/EXPORT
SELECT FEATURES
DRAWING TOOLS
MAP PREFERENCES
MODELLING
DOCUMENTATION
HELP
TABLE OF CONTENTS
Coordinate System: Timbalai 1948 RSO Borneo Meters - Scale: 1:165,409
OVERVIEW MAP
Report Template for Draft Final Report
Volume II Part II
Chapter 2: Decision Support System
2. 1 Introduction to EPDss
The Decision Support System (DSS) is a web base system that was develop as a tool to assist decision maker to monitor the quality of the five river. Sungai Segama, Sungai Sagaliud, Sungai Mainad, Sungai Kalumpang and Sungai Pang Burung was the five river selected. The DSS integrates Geographic Information System (GIS) with Water Quality Modelling. This integration used a loose coupling method where a GIS web base system will join the information from the Water Quality Modelling and display the result on a web base environment. The DSS was developed using ArcGIS Server and the Water Quality Modelling software used is QUAL2K. The DSS will assist in terms of analyzing the water quality for the five selected river which receive impact because of the pollution from a non-point source.
2.2 Objective of the EPDss
The objectives of development DSS are as follows;
To develop a user-friendly web base Dicision Support System (DSS) to assist decision maker monitor and planning the study area.
To monitor the water quality and pollution resources information

Figure 7.5: Inventory Report for Pollution Sources

7.3 PLANNING ACTIVITIES

Apart from monitoring data which describes the existing water quality conditions, there is a tool component to retrieve future planning information. The Planning menu guides users to obtain information on strategies and interventions. There are two separate tools provided which is related to spatial and non-spatial measures. The non-spatial proposals (e.g. awareness-raising and new legislations) can be navigated through a list as PDF documents. The user only needs to choose from the link by its title to access the interventions.

7.4 WATER QUALITY MODELING

The water quality model can be used to predict the characteristics of water quality conditions against desired water quality objectives. The purpose of the water quality model in the EPDSS is to simulate water quality based on “what if” scenarios.

The EPDSS has been developed using two applications, ArcGIS and QUAL2K. The integration of this software requires rigorous programming. The main purpose for integration is:

To use QUAL2K model to simulate the baseline water quality condition and predict future scenarios based on changes in land use.

To enable QUAL2K to send the results to ArcGIS for spatial visualisation.

The EPDSS utilises the capability of QUAL2K software to derive water quality parameters such as Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), Ammoniacal Nitrogen (AN) and Total Suspended Solids (TSS). The ArcGIS provides the tool to link the QUAL2K modeling results into spatial information. The calculated results will be linked to the segments by their “ID” number in ArcGIS. The spatial results will be categorised automatically based on the pollutant loading class provided.

The pre-determined *Scenarios* are also provided in this menu which enables users to access the models developed for the study. This scenario comprises of different models which is listed in the menu-pane **(Figure 7.5)**.

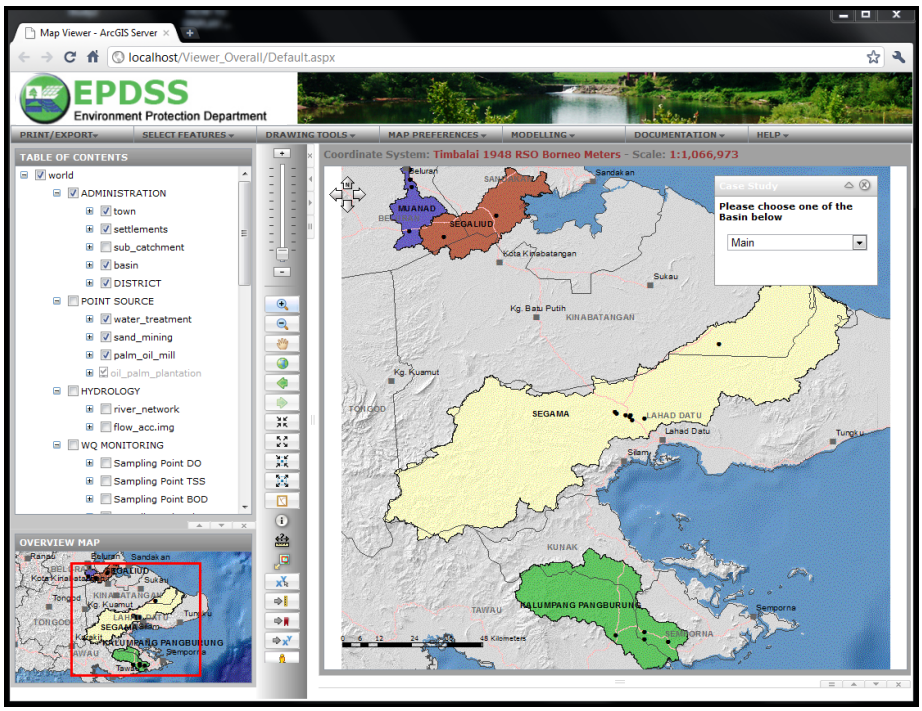


Figure 7.6: Choose case study

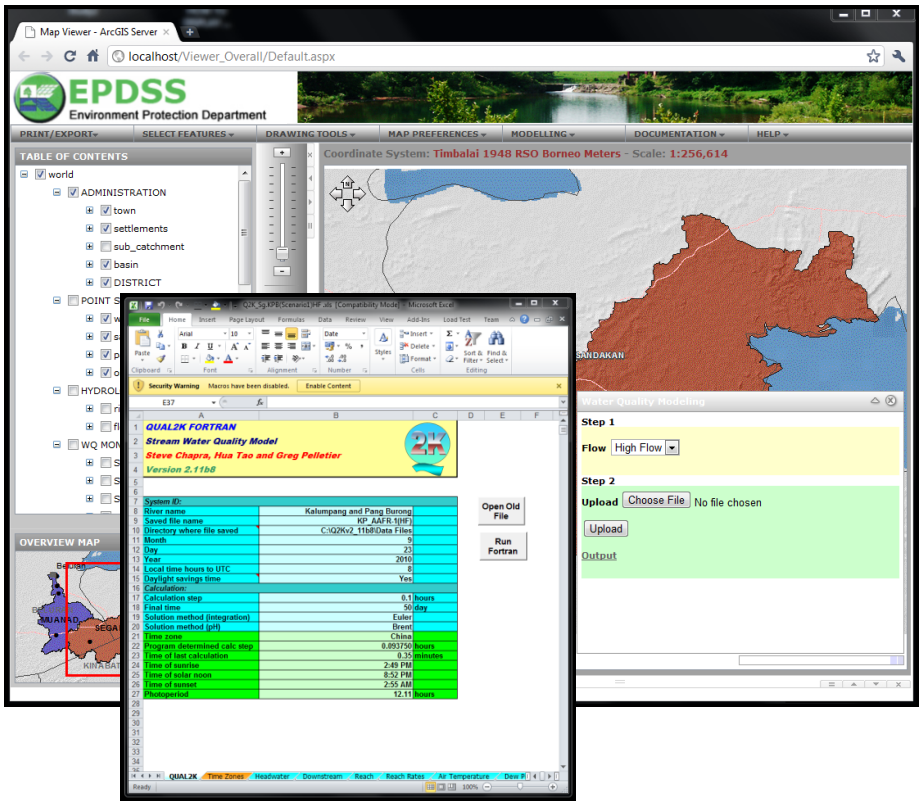


Figure 7.7: Download and Save QUAL2K

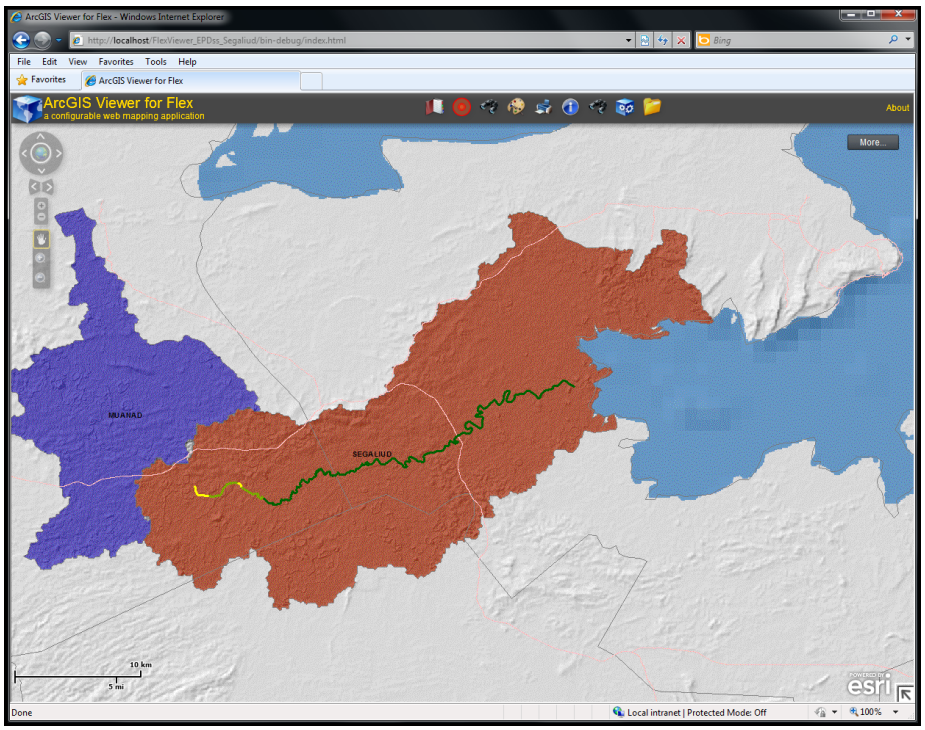


Figure 7.8: The Output in EPDSS

8 Documentation

By using the EPDSS, the user can also access the reports and maps of the case study. For report extraction, users can select text according to the respective sections of the report **(Figure 8.1)**.

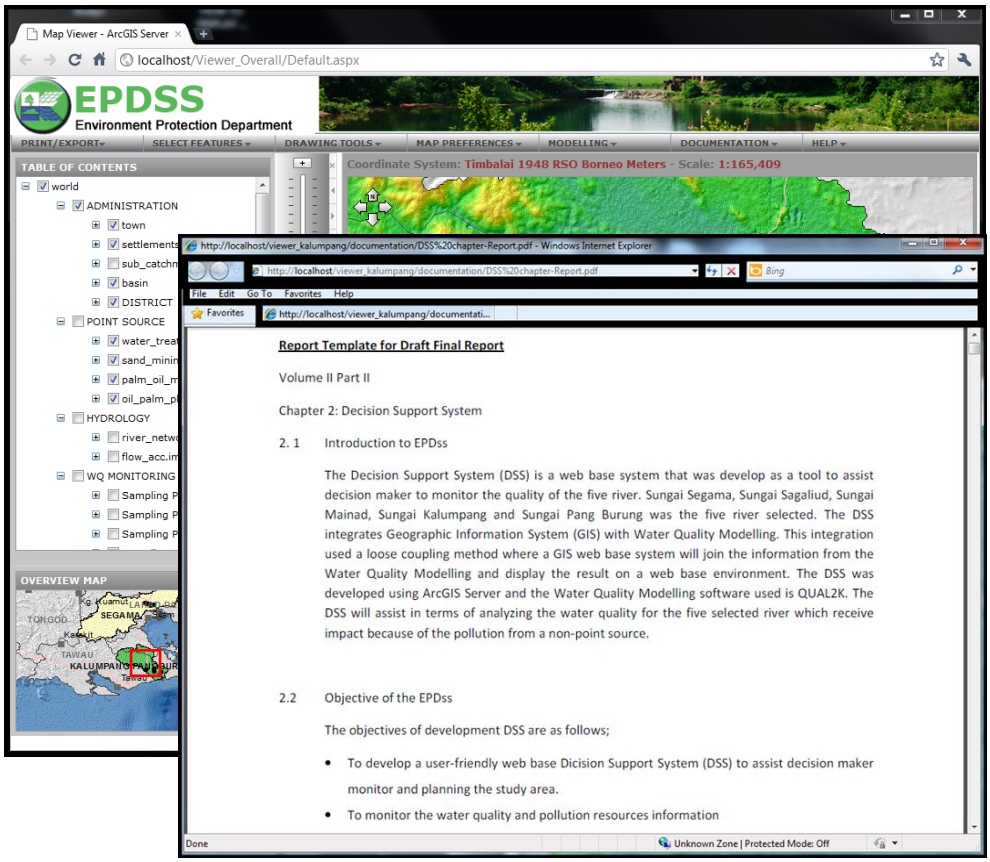

Map Viewer - ArcGIS Server
localhost/Viewer_Overall/Default.aspx
EPDSS
Environment Protection Department
PRINT/EXPORT
SELECT FEATURES
DRAWING TOOLS
MAP PREFERENCES
MODELLING
DOCUMENTATION
HELP
TABLE OF CONTENTS
Coordinate System: Timbalai 1948 RSO Borneo Meters - Scale: 1:165,409
OVERVIEW MAP
http://localhost/viewer_kalumpang/documentation/DSS%20chapter-Report.pdf - Windows Internet Explorer
Report Template for Draft Final Report
Volume II Part II
Chapter 2: Decision Support System
2. 1 Introduction to EPDss
The Decision Support System (DSS) is a web base system that was develop as a tool to assist decision maker to monitor the quality of the five river. Sungai Segama, Sungai Sagaliud, Sungai Mainad, Sungai Kalumpang and Sungai Pang Burung was the five river selected. The DSS integrates Geographic Information System (GIS) with Water Quality Modelling. This integration used a loose coupling method where a GIS web base system will join the information from the Water Quality Modelling and display the result on a web base environment. The DSS was developed using ArcGIS Server and the Water Quality Modelling software used is QUAL2K. The DSS will assist in terms of analyzing the water quality for the five selected river which receive impact because of the pollution from a non-point source.
2.2 Objective of the EPDss
The objectives of development DSS are as follows;
To develop a user-friendly web base Dicision Support System (DSS) to assist decision maker monitor and planning the study area.
To monitor the water quality and pollution resources information

Figure 8.1: Report Retrieval from the EPDSS

Supporting files such as maps are stored in the Maps section and function similar to report retrieval as shown in **Figure 8.1**. All maps have been converted to PDF and are easy to reproduce or reprint. The Adobe Reader software capability is used to navigate the entire map or report.

9 Querying

This tool allows the user to carry out querying on specific aspects of the data. For example, a query like: 'which point source is within 250m from the main river?', can be done using query tools. What a user needs to do is to select the relevant data/layer and specify the query function together with distance. In this case, select the point source, query function 'are within distance' and the river data **(Figure 9.1)**. Then specify the distance.

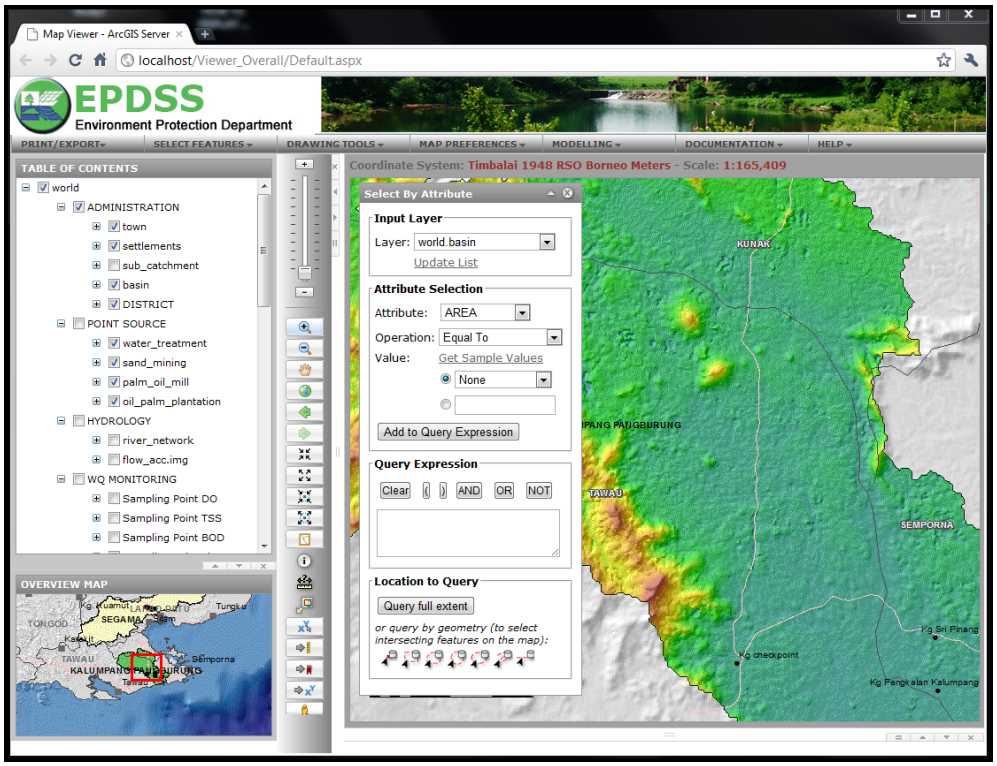
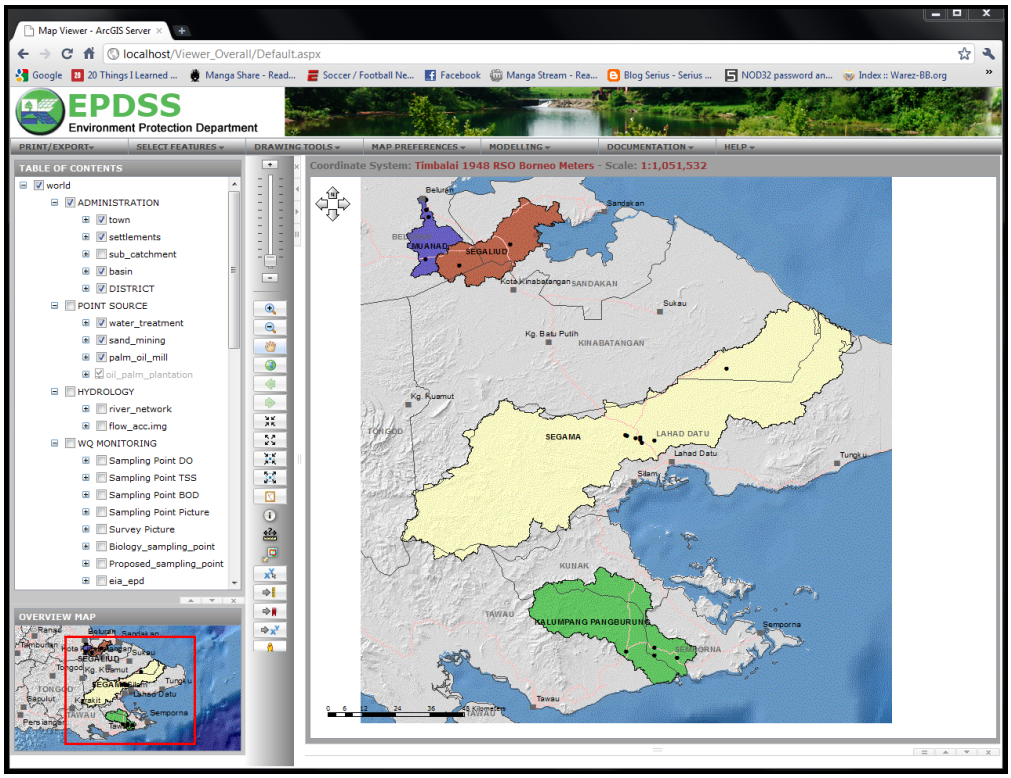


Figure 9.1: The Query Menu in the EPDSS

10 EPDSS Manual

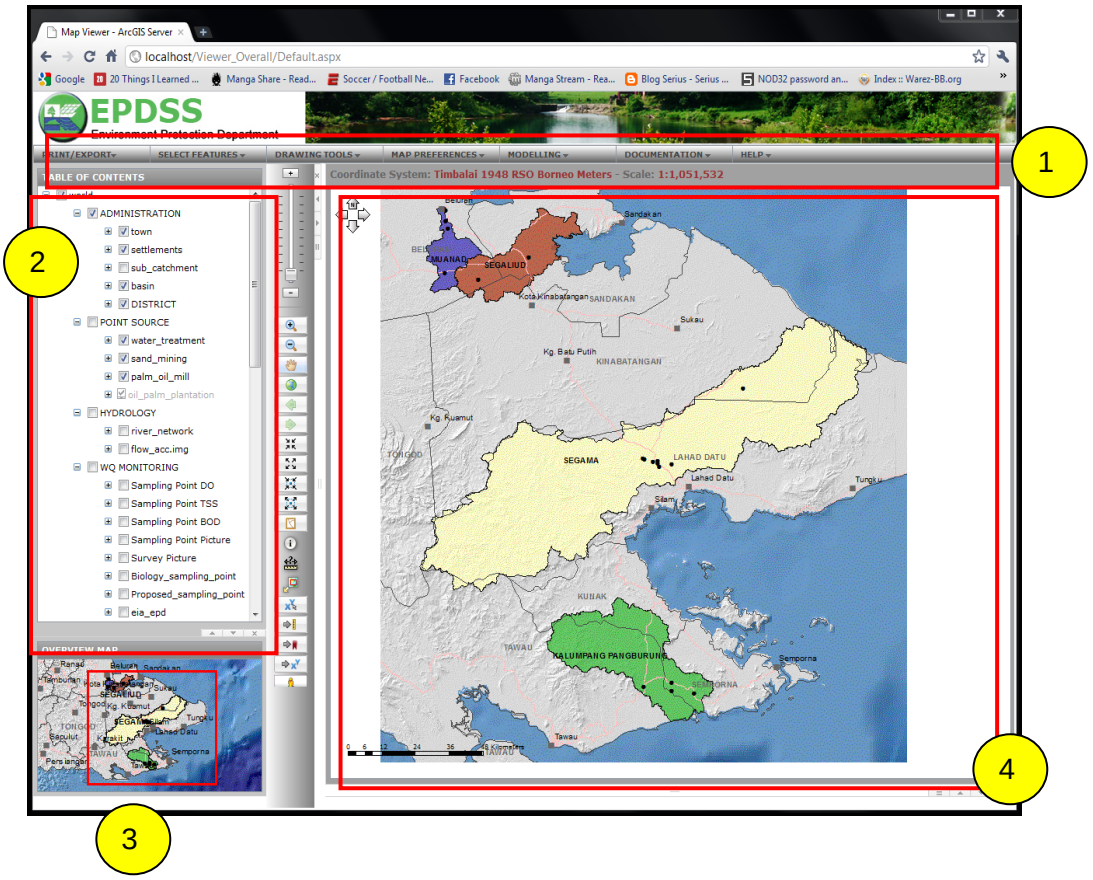
10.1 EPDSS INTERFACE

The DSS is a Web Based application, where it has been named EPDSS (Environment Protection Dicision Support System).This system is built with ArcGIS Server with the integration of QUAL2K. This system is equipped with a security where the user will require an authentication before they can use the system. The system capabilities are to retrieve spatial information and enable decision makers to use the QUAL2K and perform an analysis on a web base environment. The decision makers will have to change most parameters in QUAL2K and compute the water quality scenarios. Below is the DSS user interface for this project.



10.2 EPDSS TOOLS

There are four components in the DSS interface



DSS Menu

1

Table of content

2

Navigation Tools

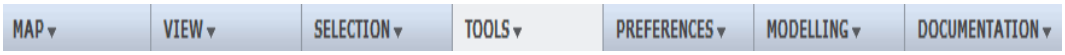
3

Viewer

4

10.3 EPDSS MENU

This menu bar allows access to all related information and modeling for EPDSS study. The toolbar is a dropdown menu which you can hover and the menus will dropdown.



The grouping menu illustrates the functionalities of each menu so that you have a choice in retrieving the information.

No	Functionality	Description
1	Map	Used for printing map
2	View	Used to control the user interface
3	Selection	Tool for simple analysis
4	Tools	Used to add temporary graphic
5	Preference	Used to control the selection option
6	Modeling	DSS Modeling
7	Documentation	Used to link all related documentation

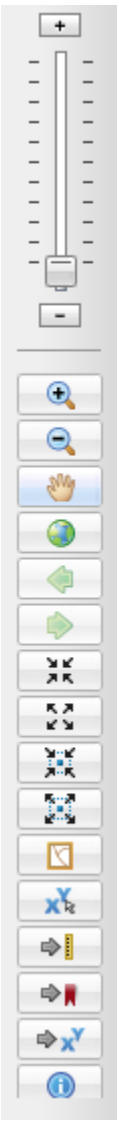
The detail of grouping by pull down menu as below:

Map	View	Selection	Tools	Preference	Modelling	Documentation
Print	Accordian Menu	Select by Attribute	Draw graphic	Set Map refresh rate	Select case study	
Export	Result Menu	Select by feature buffer	Draw label	Set selection symbols	Open Qual2K	
	Overview	Select by point buffer	Draw shape			
		Select by location	Measure			
			Magnifier			

10.4 NAVIGATION TOOLS

10.4.1 TOOLBAR

The toolbar allows you to navigate and query within the active data frame. It allows you to interact with the system according to required application.

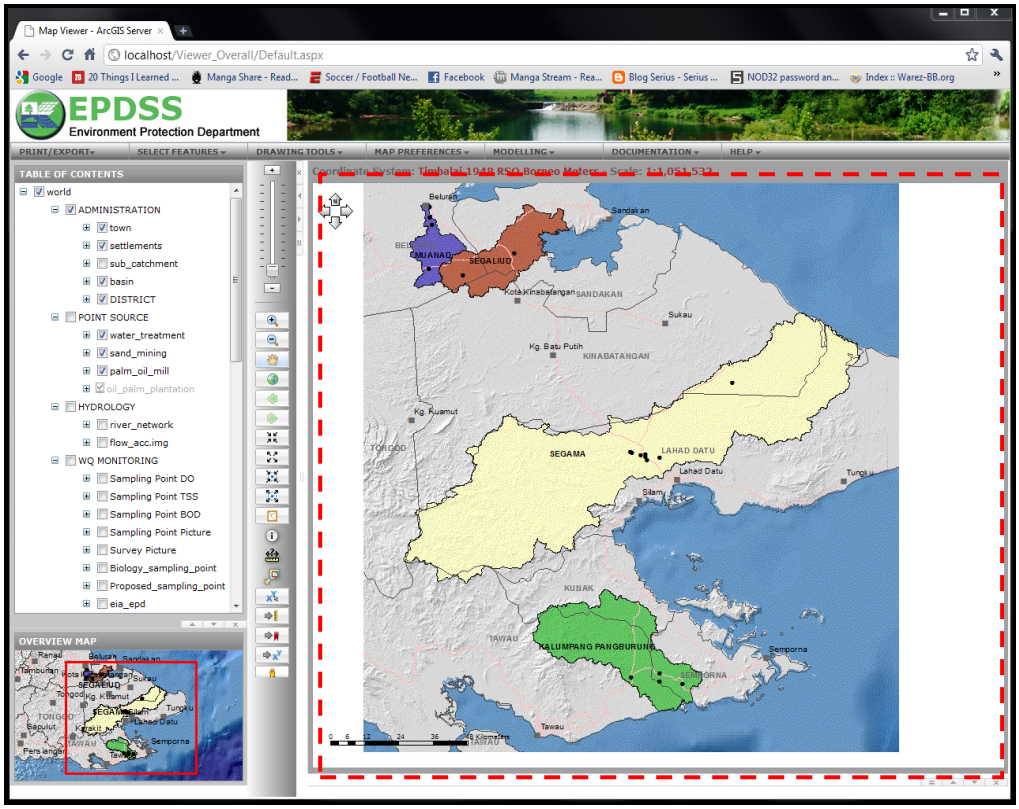


	Allows you to zoom in to a geographic window by clicking a point or dragging a box
	Allows you to zoom out from a geographic window by clicking a point or dragging a box
	Allows you to pan the data frame
	Allows you to zoom to the full extent of your map
	Allows you to go back to the previous extent
	Allows you to go forward to the next extent
	Deselects all of the currently selected features in the active data frame

10.5 EPDSS FUNCTIONALITY

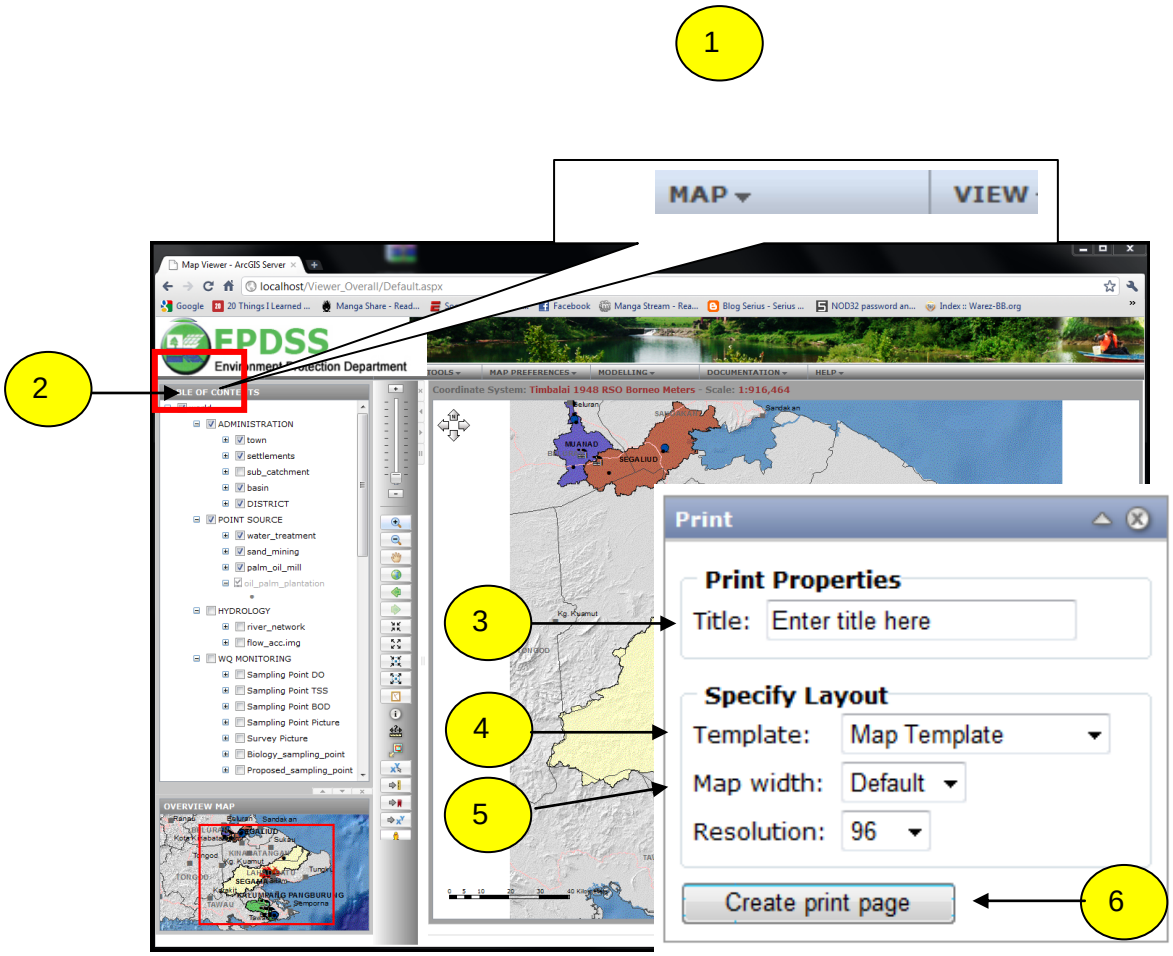
10.5.1 MAP DISPLAY

The most basic functionality is to display all the spatial data in the web environment. ArcGIS Server will be used as EPDss basic platform to display all the spatial data in the web environment.



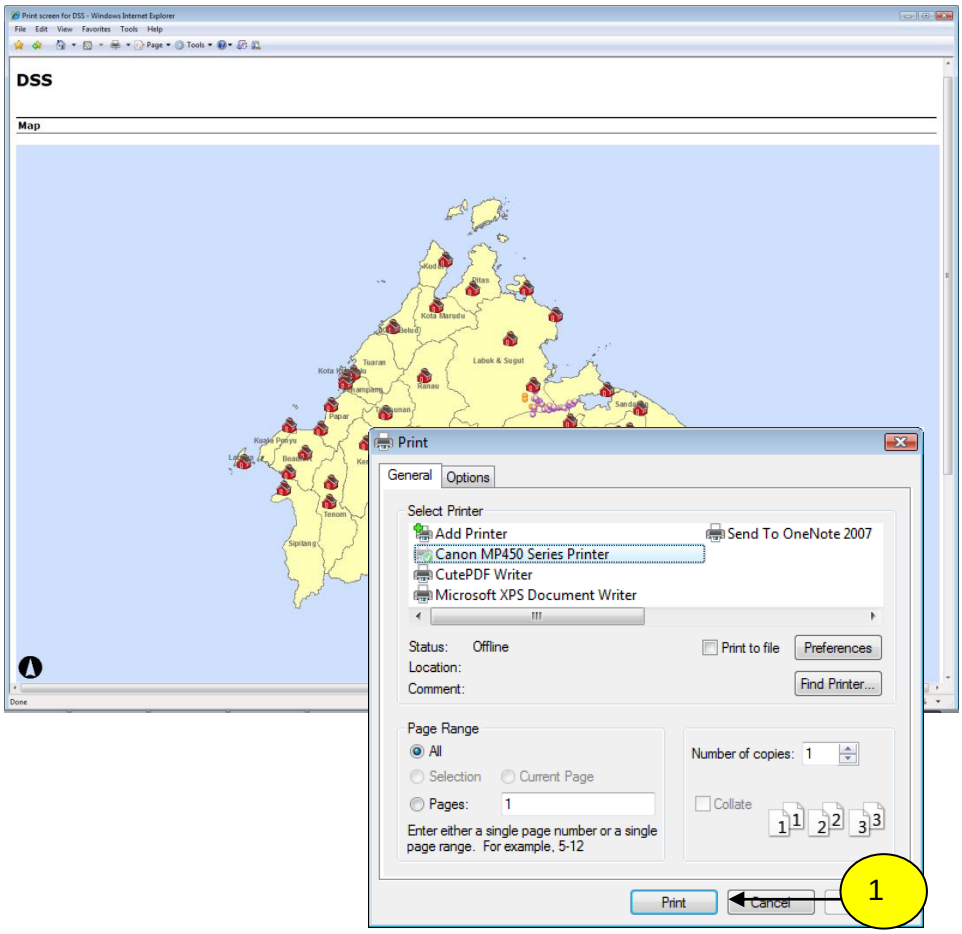
10.5.2 PRINT

The Web mapping application may allow you to print the map and the results from search and other operations.



No	Description
1	Hover the mouse to Map Drop Down Menu
2	Choose Print
3	Enter the Title for the Print page
4	Choose Template
5	Choose Map widh
6	Click “Create print page”

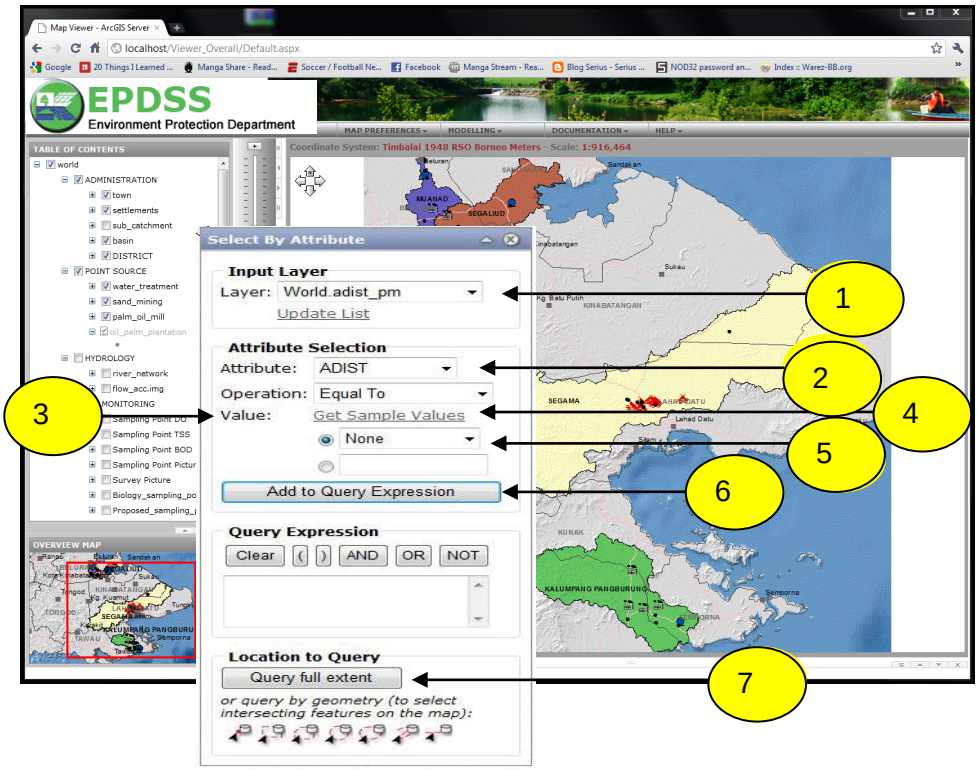
A print page will be generated by the system.



No	Description
1	Click Print

10.5.3 SELECT BY ATTRIBUTE

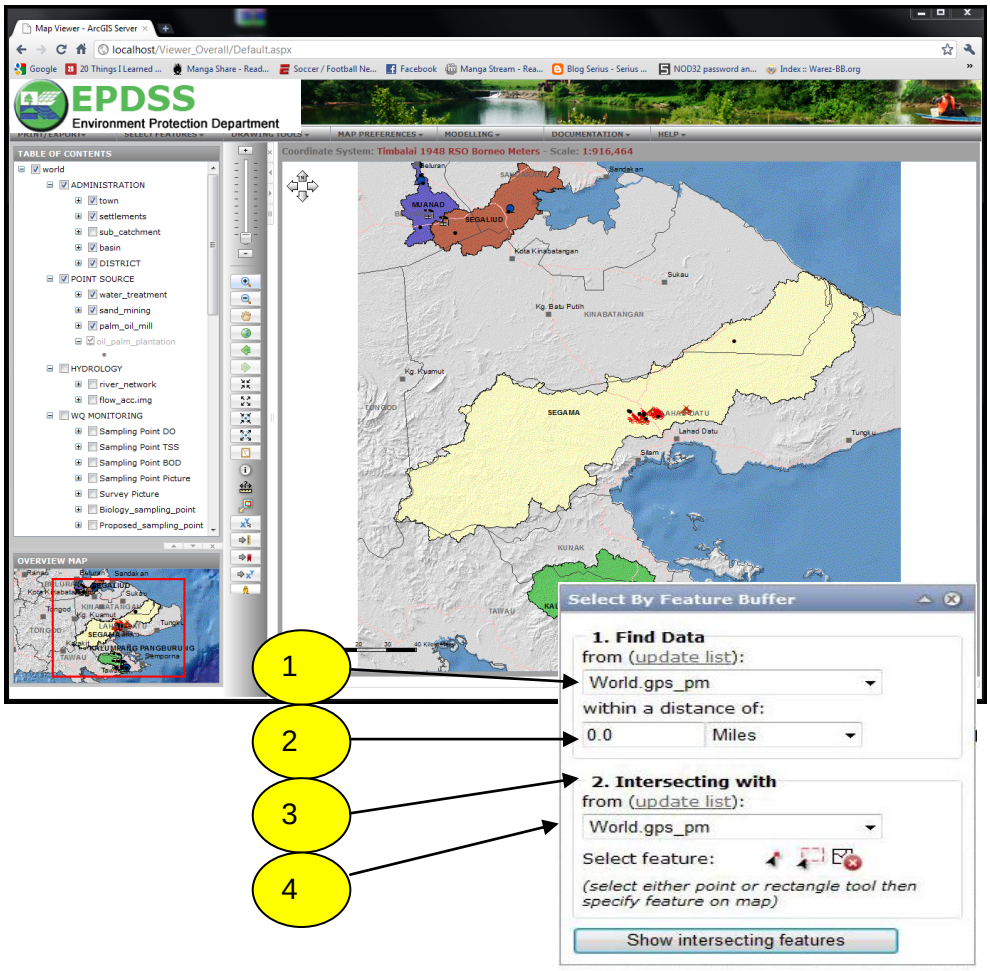
Select by attribute is the tool that will be use by the user to query all the spatial data inside the database.



No	Name	Description
1	Layer	Used to choose layer
2	Attribute	Used to choose field
3	Operation	Used to choose operation
4	Value	Used to get sample value
5	Choose value	Used to choose value
6	Add to Query Expression	Used to add query into query expression
7	Query full extend	Used to process the query and display the result

10.5.4 SELECT BY FEATURE BUFFER

Buffer is use to find an information within a selected area.

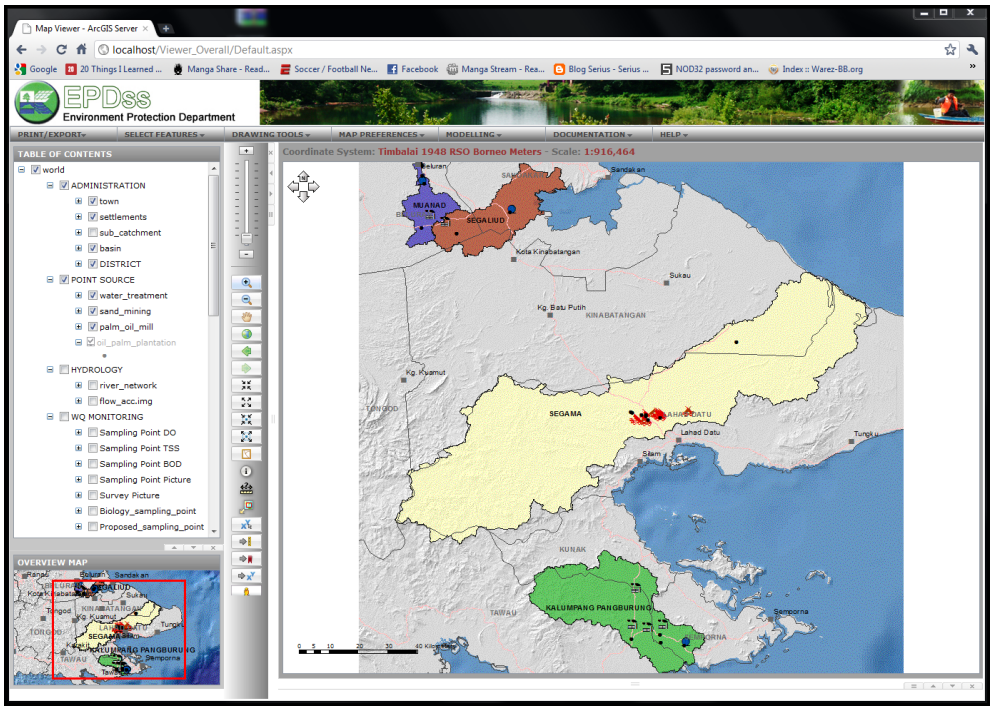


No	Name	Description
1	Field Data	Used to choose layer
2	Distance	Used to choose distance
3	Intersect with	Used to choose layer to intersect
4	Show intersect	Used to get result

Use the select tool to select the feature inside the map.

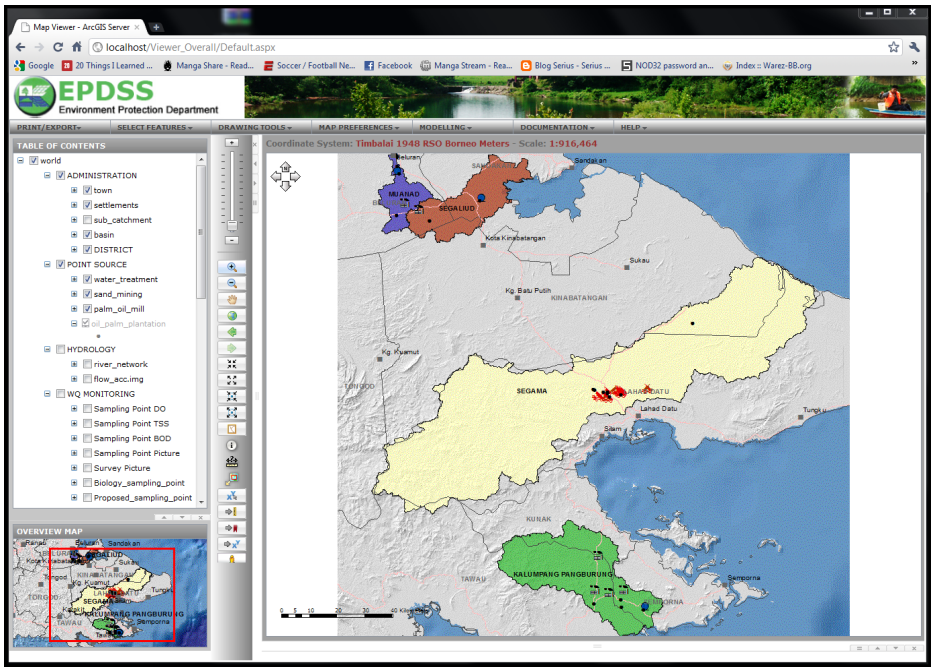
10.5.5 SELECT BY LOCATION

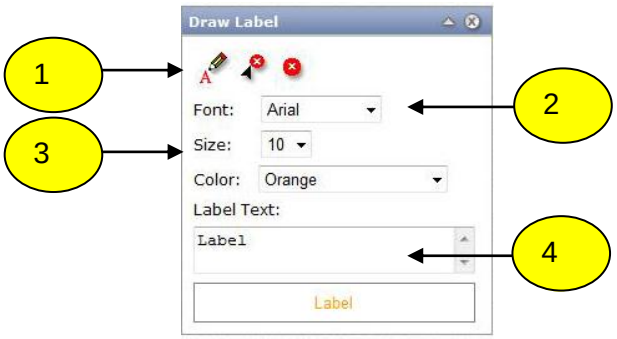
Select by location is a tool to select any feature in the map.



10.6 DRAW LABEL

Draw label is used to draw temporary graphic to the map.

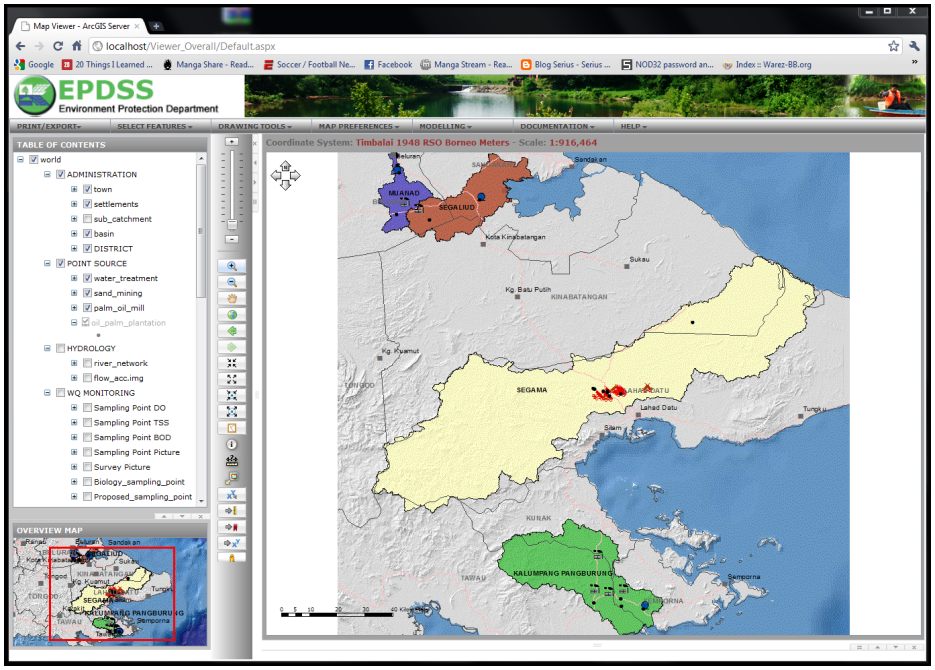


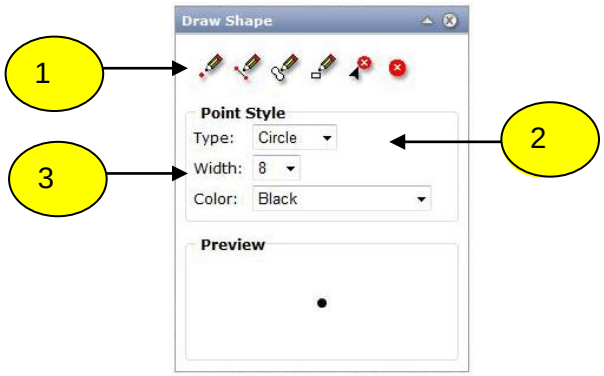


No	Description
1	Click on the drawing tool
2	Choose the font
3	Choose the size
4	Type in the text

10.7 DRAW SHAPE

Draw shape is used to draw temporary graphic to the map.

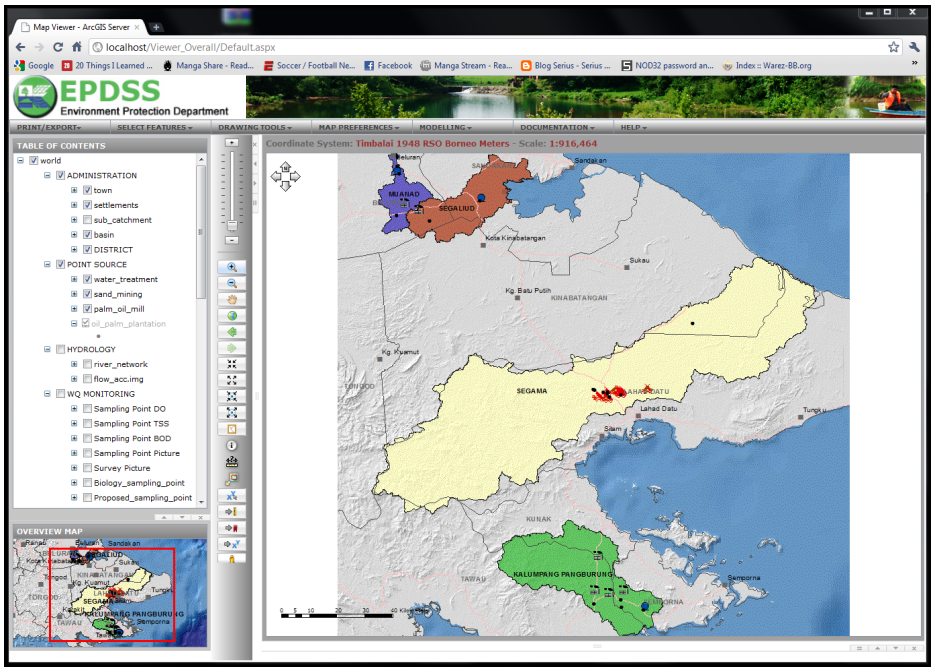


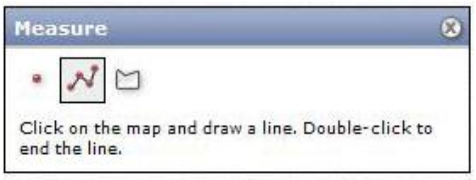


No	Description
1	Click on the drawing tool
2	Choose the font
3	Choose the width
4	Click on the map

10.8 MEASURE

Measure is used to measure the coordinate and distance in the map.

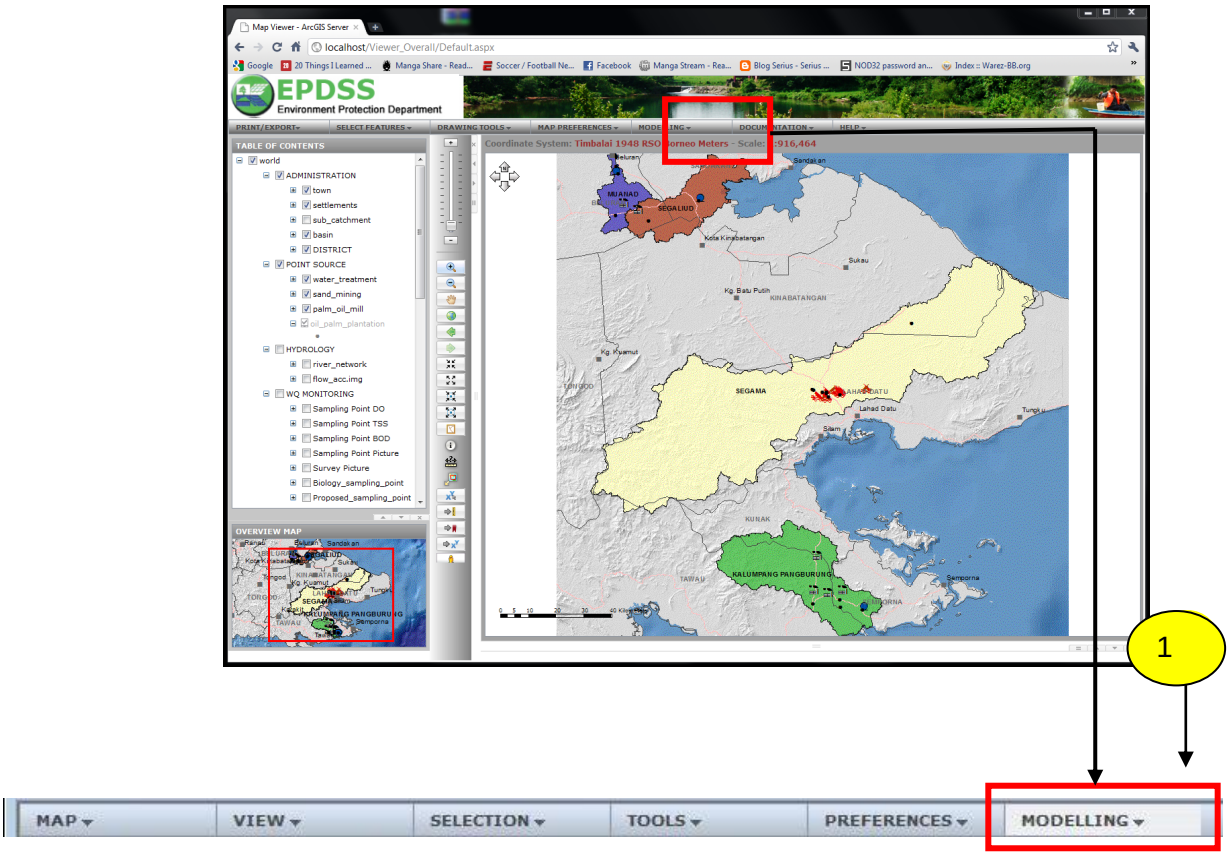




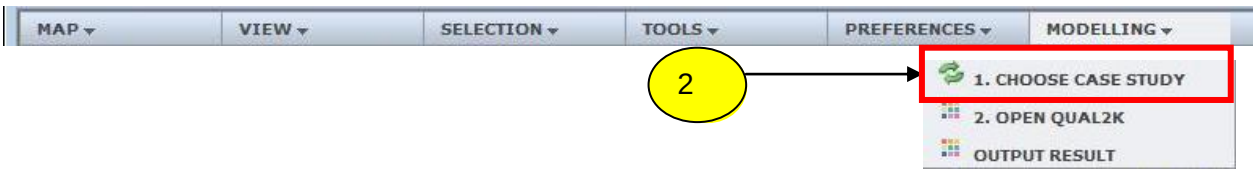
No	Description
1	Click on the measure tool
2	Click on the map

10.9 MODELING

The Qual2K Water Quality Model for Sg, Linggi is build into the DSS.



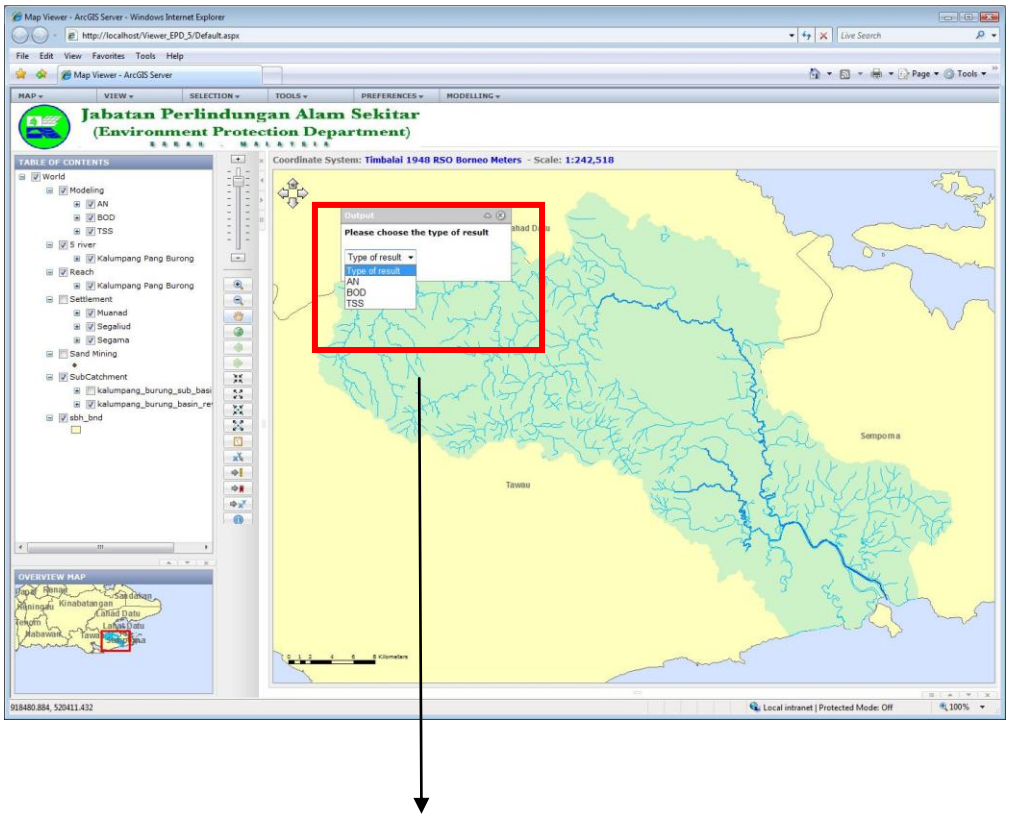
Hover the mouse to the Modeling Drop Down menu to start the DSS workflow.

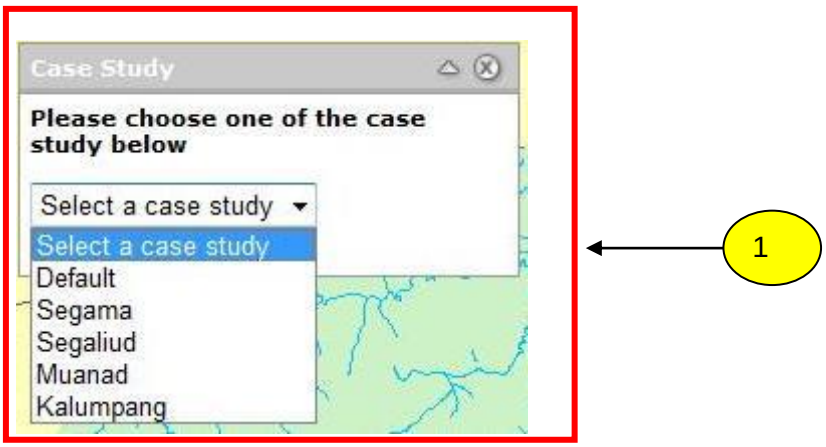


A list will appear and the user must follow the workflow.

No	Description
1	Hover the mouse
2	Click “Choose Case Study”

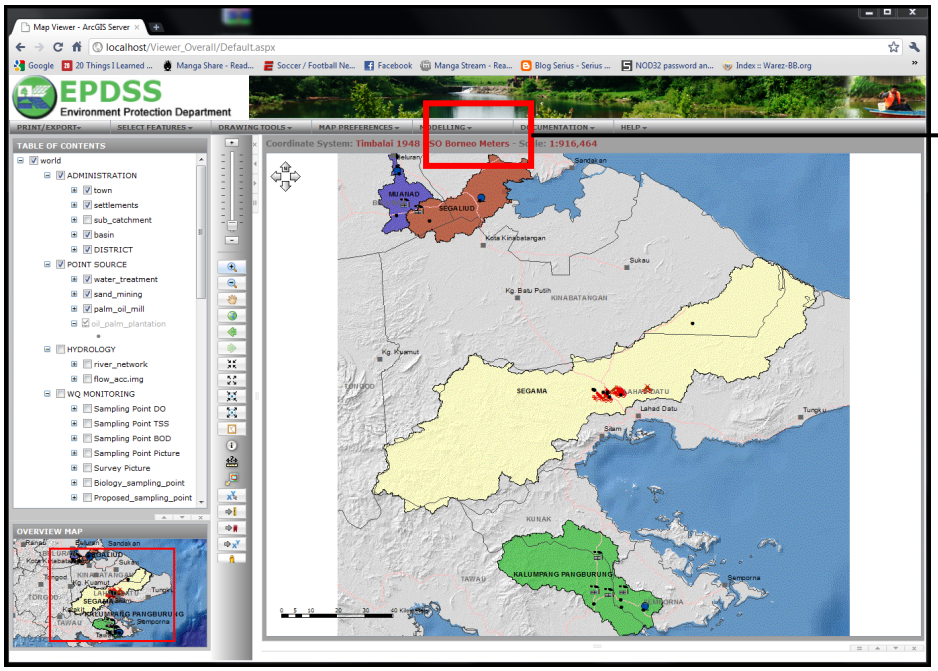
A pop-up will appear and the user have to chose a case study.



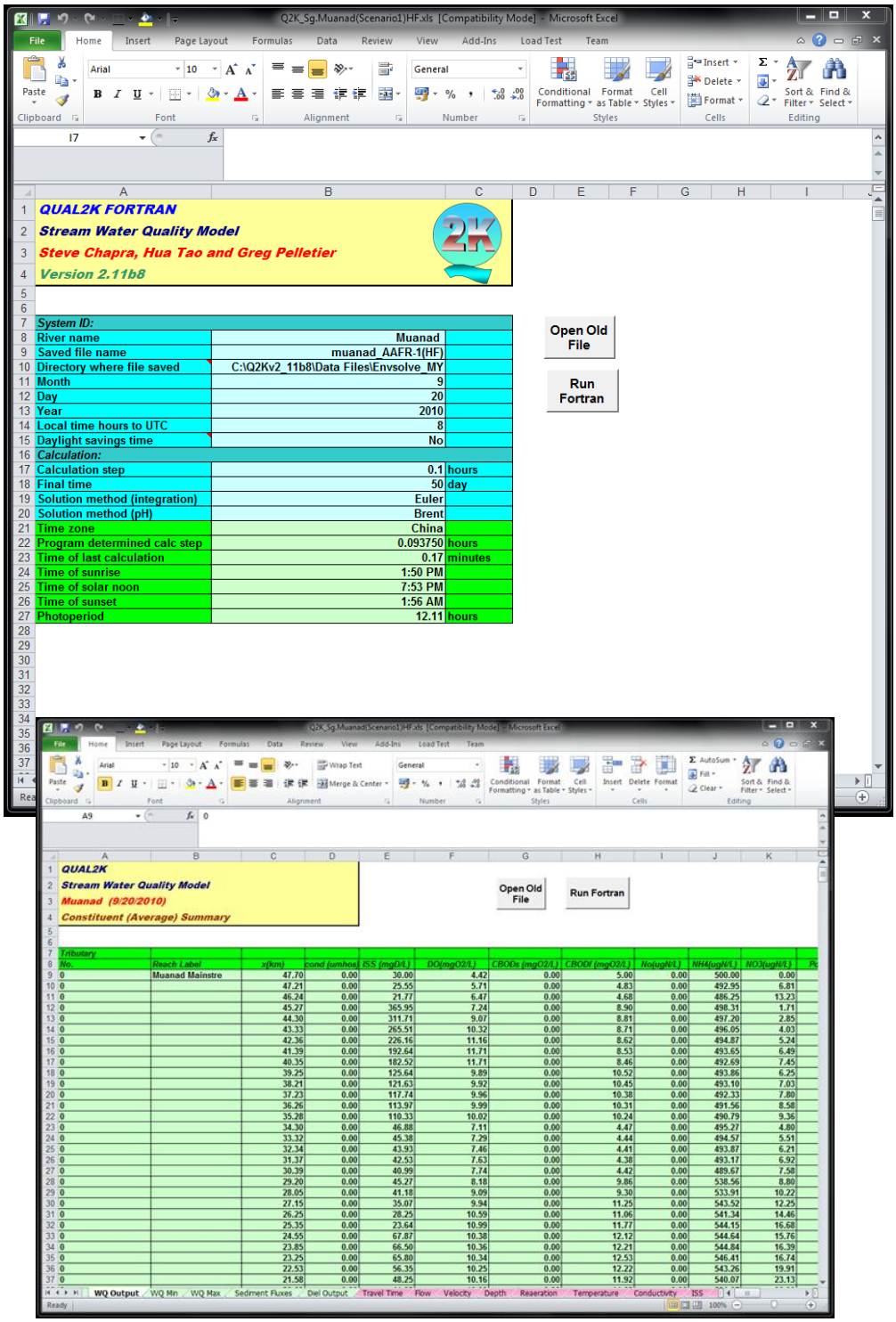


No	Description
1	Choose a case study

The view will change base on the case study chosen by the user.

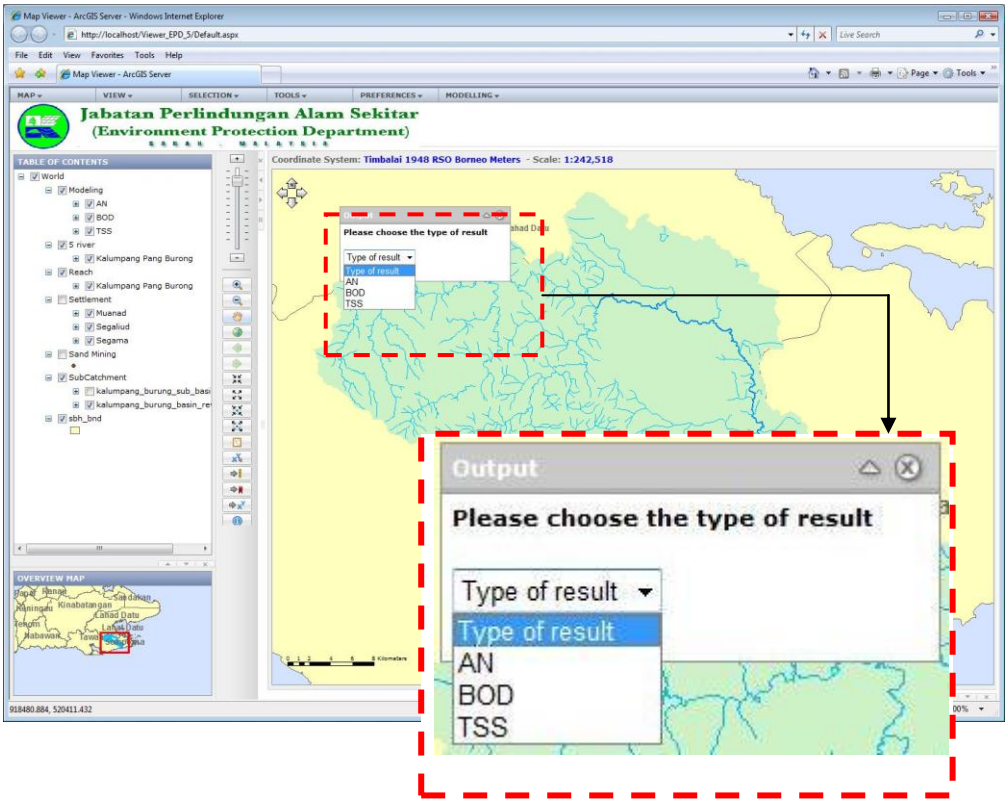

EPDSS
Environment Protection Department
TABLE OF CONTENTS
OVERVIEW MAP

MAP
VIEW
SELECTION
TOOLS
PREFERENCES
MODELLING
1
1. CHOOSE CASE STUDY
2. OPEN QUAL2K
OUTPUT RESULT


Q2K_Sg.Muanad(Scenario1)HF.xls [Compatibility Mode] - Microsoft Excel
QUAL2K FORTRAN
Stream Water Quality Model
Steve Chapra, Hua Tao and Greg Pelletier
Version 2.11b8
Open Old File
Run Fortran
System ID:
River name Muanad
Saved file name muanad_AAFR-1(HF)
Directory where file saved C:\Q2Kv2_11b8\Data Files\Envsolve_MY
Month 9
Day 20
Year 2010
Local time hours to UTC 8
Daylight savings time No
Calculation:
Calculation step 0.1 hours
Final time 50 day
Solution method (integration) Euler
Solution method (pH) Brent
Time zone China
Program determined calc step 0.093750 hours
Time of last calculation 0.17 minutes
Time of sunrise 1:50 PM
Time of solar noon 7:53 PM
Time of sunset 1:56 AM
Photoperiod 12.11 hours
QUAL2K
Stream Water Quality Model
Muanad (9/20/2010)
Constituent (Average) Summary
Open Old File
Run Fortran
Tributary No. Reach Label x(km) cond (umhos) ISS (mg/L) DO(mgO2/L) CBODu (mgO2/L) CBODf (mgO2/L) No(ugN/L) NH4(ugN/L) NO3(ugN/L)
Muanad Mainstre
WQ Output WQ Min WQ Max Sediment Fluxes Diel Output Travel Time Flow Velocity Depth Reaeration Temperature Conductivity ISS

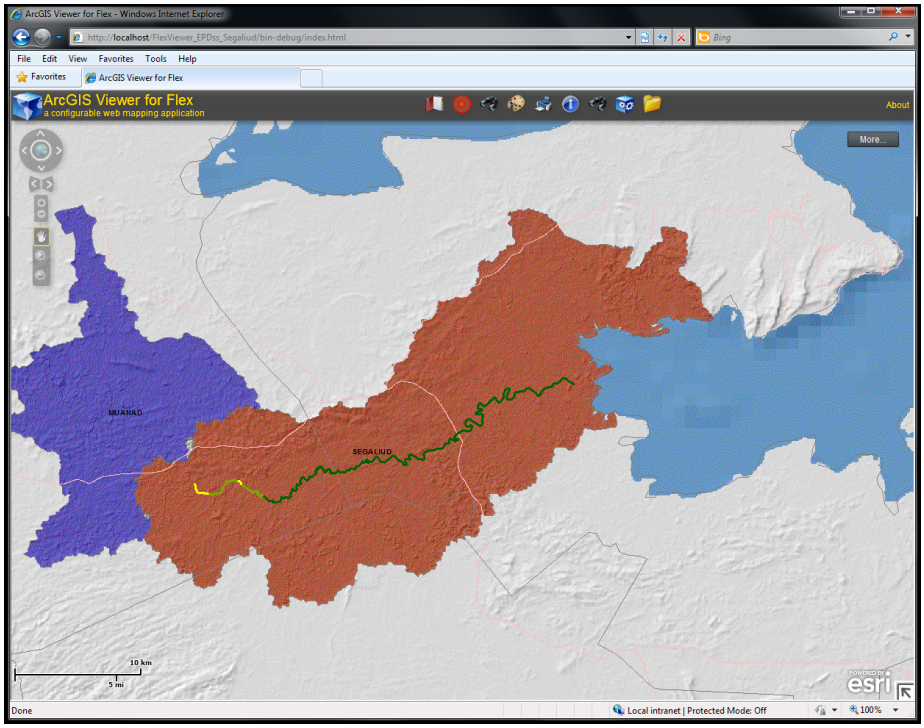
No	Description
1	Click Open Qual2K

Here the user will be able to do customize QUAL2K and produce an output based on the type of result.



No	Description
1	Choose the type of result

The colour theme appears based on the selection.



11 TROUBLESHOOTING ARCGIS SERVER

11.1 INSTALLATION

11.1.1 VERIFY SYSTEM REQUIREMENT

a) Supported operating system

The operating systems below satisfy the minimum operating system requirements:

Windows 2003 Service Pack 2 Server Standard, Enterprise & Datacenter (32-bit and 64-bit (EM64T)

Windows 2008 Server Standard, Enterprise & Datacenter (32-bit and 64-bit (EM64T).

Windows 2008 R2 Server Standard, Enterprise & Datacenter (64-bit (EM64T)

Windows 7 Ultimate, Professional Edition (32-bit and 64-bit (EM64T)

Windows Vista Service Pack 1 Ultimate, Enterprise, Business (32-bit and 64-bit (EM64T)

Windows XP Service Pack 3 Professional Edition (32-bit)

Windows XP Service Pack 2 Professional Edition (64-bit (EM64T)

The following disk space is required to install ArcGIS Server for the Microsoft .NET Framework (both ArcGIS Server 10 - GIS Services and ArcGIS Server 10 - Web Applications):

Disk space requirements	
Complete installation	2000 MB 350 MB of this disk space will be required on your system drive.

11.1.2 MICROSOFT .NET FRAMEWORK REQUIREMENT

ArcGIS Server for the Microsoft .NET Framework requires Microsoft .NET Framework 3.5 Service Pack 1. Microsoft .NET Framework 3.5 Service Pack 1 is available on the ArcGIS Server for the Microsoft .NET Framework media. However, on Windows 7 and Windows Server 2008 R2, Microsoft .NET Framework 3.5 Service Pack 1 must be installed using Windows Features. Follow the instructions below to install Microsoft .NET Framework 3.5 SP1 on Windows 7 and Windows Server 2008 R2:

a) Windows 7 :

Go to Control Panel > Programs > Turn Windows Features on or off. Enable and install the Microsoft .NET Framework 3.5.1

b) Windows Server 2008 R2:

Open Server Manager -> Features -> Add Features. Enable and install the Microsoft .NET Framework 3.5.1

c) Internet Explorer 7.0 or higher required

Microsoft Internet Explorer version 7.0 or higher is required. You must obtain and install Internet Explorer version 7.0 or higher prior to installing ArcGIS Server for the Microsoft .NET Framework.

11.1.3 SUPPORT FOR 64-BIT PROCESSORS

ArcGIS Server 9.2 and higher is supported on the Intel and AMD 64-bit processor families. ArcGIS Server is a native 32-bit application. It is certified to run as a 32-bit application on 64-bit (x64) Microsoft Windows.

11.1.4 MICROSOFT VISUAL STUDIO

The Web ADF Visual Studio 2008 Integration feature of the ArcGIS Server - Web Applications setup requires Visual Studio 2008 Service Pack 1.

The Web ADF Visual Studio 2010 Integration feature of the ArcGIS Server - Web Applications setup requires Visual Studio 2010.

a) Microsoft Visual Studio 2008 Express Editions

The Visual Web Developer 2008 Express Integration feature of the ArcGIS Server - Web Applications setup requires Microsoft Visual Web Developer 2008 Express Edition Service Pack 1 to be installed.

b) Microsoft Visual Studio 2010 Express Editions

The Visual Web Developer 2010 Express Integration feature of the ArcGIS Server - Web Applications setup requires Microsoft Visual Web Developer 2010 Express Edition to be installed.

11.1.5 MICROSOFT INTERNET INFORMATION SERVICES (IIS)

The following features require Microsoft IIS:

The Services Manager feature of the ArcGIS Server - GIS Services setup

The Web Services (SOAP, REST) feature of the ArcGIS Server - GIS Services setup

The Applications Manager feature of the ArcGIS Server - Web Applications setup

11.1.6 WINDOWS SERVER 2008/ R2 IIS REQUIREMENTS

The ArcGIS Server for the Microsoft .NET Framework installation process on the Windows Server 2008 and Windows Server 2008 R2 operating systems require specific components of Internet Information Services (IIS) to be installed. If these components are not installed, certain features will not be available. Features include Services Manager and Web Services features of the GIS Services setup and the Applications Manager feature of the Web Applications setup. The Web Server (IIS) components detailed below satisfy the minimum requirements for these features.

The IIS components listed below are only minimum requirements. If other IIS components are installed, they do not need to be removed.

11.1.7 STEPS TO ADD WEB SERVER (IIS) COMPONENTS ON WINDOWS SERVER 2008 AND WINDOWS SERVER 2008 R2

Click Start > Administrative Tools > Server Manager > Roles.

Click Add Roles.

Select Web Server (IIS) from the list and click Next.

On the Select Role Services dialog box, verify that the Web Server (IIS) components listed below are turned on.

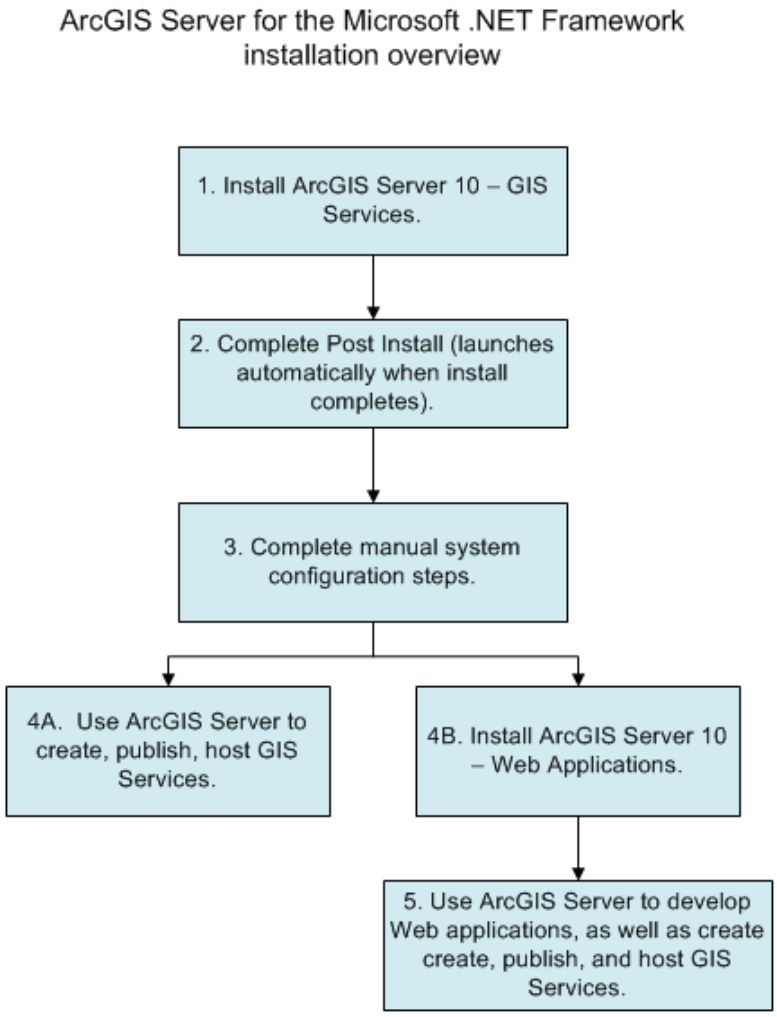
The following Web Server (IIS) components must be installed when performing an installation on Windows Server 2008 and Windows Server 2008 R2. If these components are not installed, the dependent features will not be available.

a) Web Server (IIS)

- Web Server
- Common HTTP Features
- Static Content
- Application Development
- ASP.NET
- .NET Extensibility
- ISAPI Extensions
- ISAPI Filters
- Security
- Basic Authentication
- Windows Authentication
- Request Filtering
- Management Tools
- IIS Management Console
- IIS Management Scripts and Tools
- Management Service
- IIS 6 Management Compatibility
- IIS 6 Metabase Compatibility

11.2 INSTALLING ARCGIS SERVER FOR MICROSOFT .NET FRAMEWORK OVERVIEW

Installation of ArcGIS Server for the Microsoft .NET Framework has been separated into two separate setups. The diagram below details the steps necessary to install and configure ArcGIS Server for the Microsoft .NET Framework.


ArcGIS Server for the Microsoft .NET Framework installation overview
1. Install ArcGIS Server 10 – GIS Services.
2. Complete Post Install (launches automatically when install completes).
3. Complete manual system configuration steps.
4A. Use ArcGIS Server to create, publish, host GIS Services.
4B. Install ArcGIS Server 10 – Web Applications.
5. Use ArcGIS Server to develop Web applications, as well as create create, publish, and host GIS Services.

11.3 INSTALLING GIS SERVICES

The ArcGIS Server 10 - GIS Services setup program is one of two that comprise ArcGIS Server for the Microsoft .NET Framework. The GIS Services setup includes Server Object Manager (SOM), Server Object Container (SOC), Python, Services Manager, and Web Services (SOAP, REST).

11.3.1 HOW TO PREPARE TO INSTALL THE GIS SERVICES SETUP PROGRAM

Verify that your site meets the system requirements. For system requirement information, seeStep 1: Verify system requirements.

Log in as a user with administrative privileges.

Close all applications on your computer.

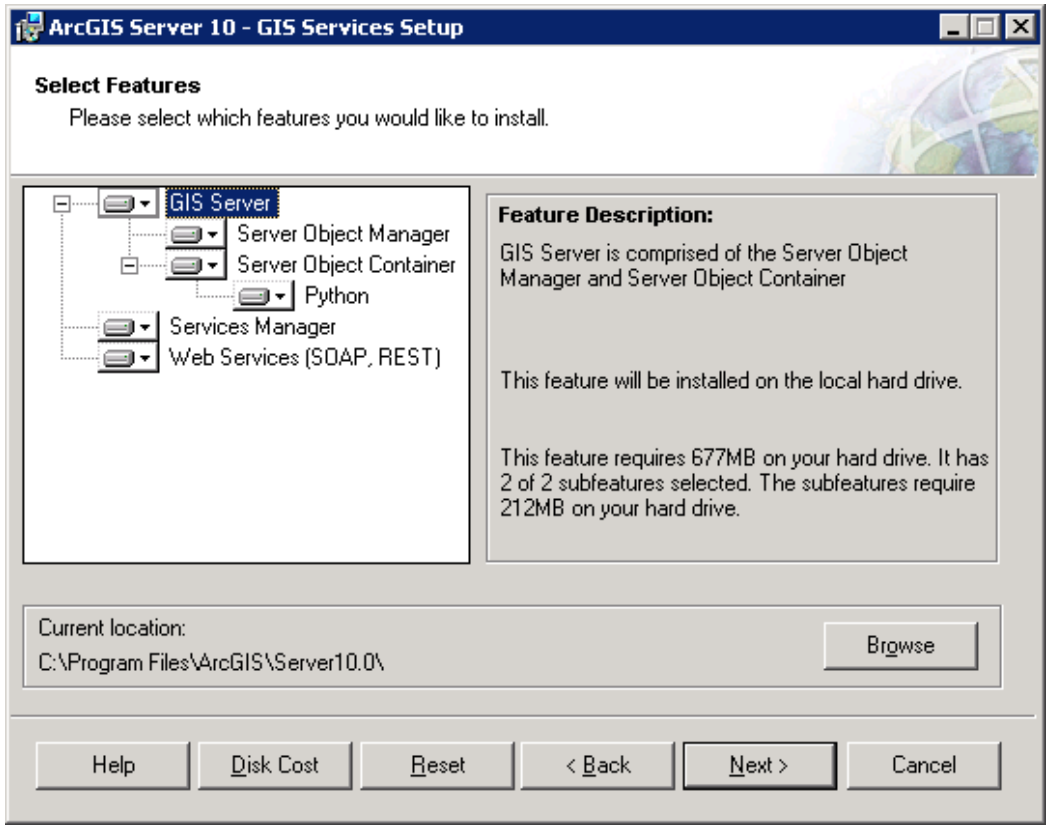
Insert the ArcGIS Server for the Microsoft .NET Framework media into the appropriate drive to automatically launch the media front end.

11.3.2 HOW TO INSTALL THE GIS SERVICES SETUP PROGRAM

From the media front end, click the **GIS Services setup** link to launch the ArcGIS Server 10 - GIS Services setup program.

During the installation, read the license agreement and accept it, or exit if you do not agree with the terms.

The GIS Services installation allows you to select the features you want.

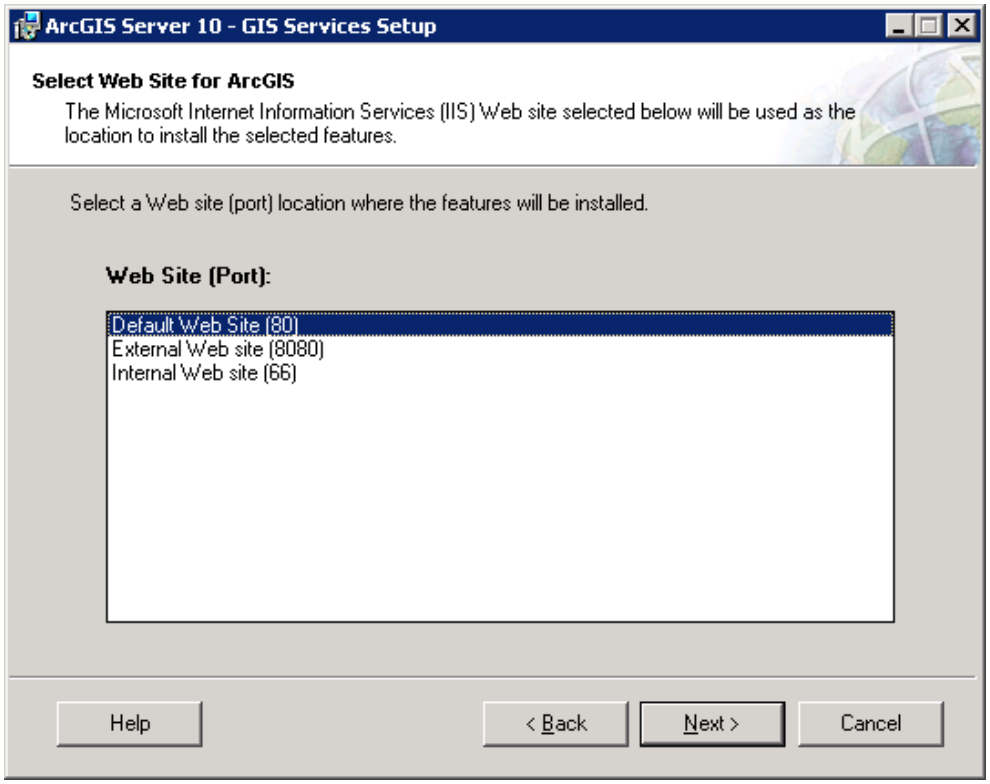

ArcGIS Server 10 - GIS Services Setup
Select Features
Please select which features you would like to install.
GIS Server
Server Object Manager
Server Object Container
Python
Services Manager
Web Services (SOAP, REST)
Feature Description:
GIS Server is comprised of the Server Object Manager and Server Object Container
This feature will be installed on the local hard drive.
This feature requires 677MB on your hard drive. It has 2 of 2 subfeatures selected. The subfeatures require 212MB on your hard drive.
Current location:
C:\Program Files\ArcGIS\Server10.0\
Browse
Help
Disk Cost
Reset
< Back
Next >
Cancel

The ArcGIS Server 10 - GIS Services setup consists of a collection of features and subfeatures. An example of a feature is Server Object Container, which consists of one subfeature, Python. Features consisting of subfeatures will have a plus (+) or minus (-) sign to their left. The plus sign will expand the feature so that you can view its subfeatures. The minus sign will collapse the list of subfeatures.

Python is a subfeature of the Server Object Container feature. If Python 2.6.X and Numerical Python 1.3.0 are already installed on your machine, the Python feature will be available for installation, but Python 2.6.5 and Numerical Python 1.3.0 will not be reinstalled.

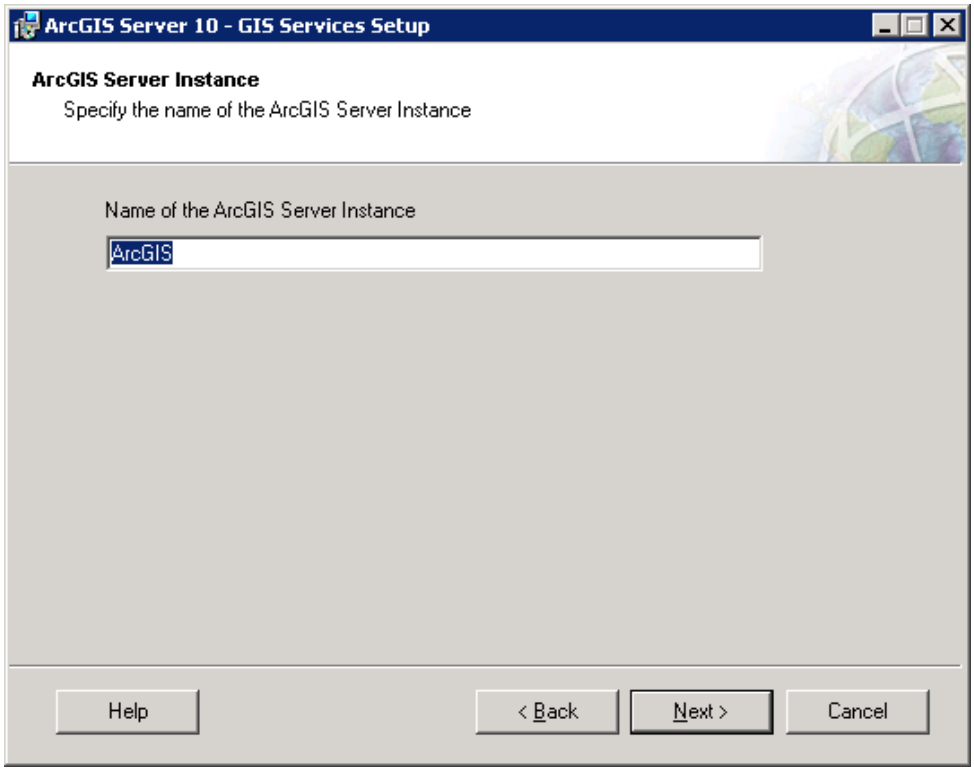
If the Python feature is selected for installation and Python 2.6.X and Numerical Python 1.3.0 are not installed on your machine, you will be provided the opportunity to choose the Python installation directory. The default installation location is C:\Python26\.

Select a Web site for the ArcGIS Server instance. Available Web sites are listed as <Web site name (port)>.


ArcGIS Server 10 - GIS Services Setup
Select Web Site for ArcGIS
The Microsoft Internet Information Services (IIS) Web site selected below will be used as the location to install the selected features.
Select a Web site (port) location where the features will be installed.
Web Site (Port):
Default Web Site (80)
External Web site (8080)
Internal Web site (66)
Help
< Back
Next >
Cancel

If you do not see the ***Select a Web site*** dialog box, this means you only have one Web site. If only one Web site is found on your machine, the ArcGIS Server instance is automatically placed on that Web site without displaying the Select a Web site dialog box.

Enter the name of the ArcGIS Server instance. The default value is ArcGIS.



Note:

If ArcGIS Server 10 - Web Applications is installed, you will not be given the option to configure the ArcGIS Server instance. Services Manager and Web Services are automatically installed to the same instance created by the ArcGIS Server 10 - Web Applications installation process.

11.4 INSTALLING WEB APPLICATIONS

The ArcGIS Server 10 - Web Applications setup program is one of two that comprise ArcGIS Server for the Microsoft .NET Framework. The Web Applications setup includes Applications Manager, Web Applications Developer Framework (ADF), and ArcGIS Applications and APIs Shortcuts.

The Web ADF provides the resources necessary to develop ArcGIS Server Web Mapping Applications (WMAs).

11.4.1 HOW TO PREPARE TO INSTALL THE WEB APPLICATIONS SETUP PROGRAM

Verify that your site meets the system requirements. For system requirement information.

Log in as a user with administrative privileges.

Close all applications on your computer.

Insert the ArcGIS Server for the Microsoft .NET Framework media into the appropriate drive to automatically launch the media front end.

Note:

ArcGIS Server for the Microsoft .NET Framework requires the following:

.NET Framework 3.5 Service Pack 1. The Microsoft .NET Framework 3.5 Service Pack 1 is available on the ArcGIS Server for the Microsoft .NET Framework media.

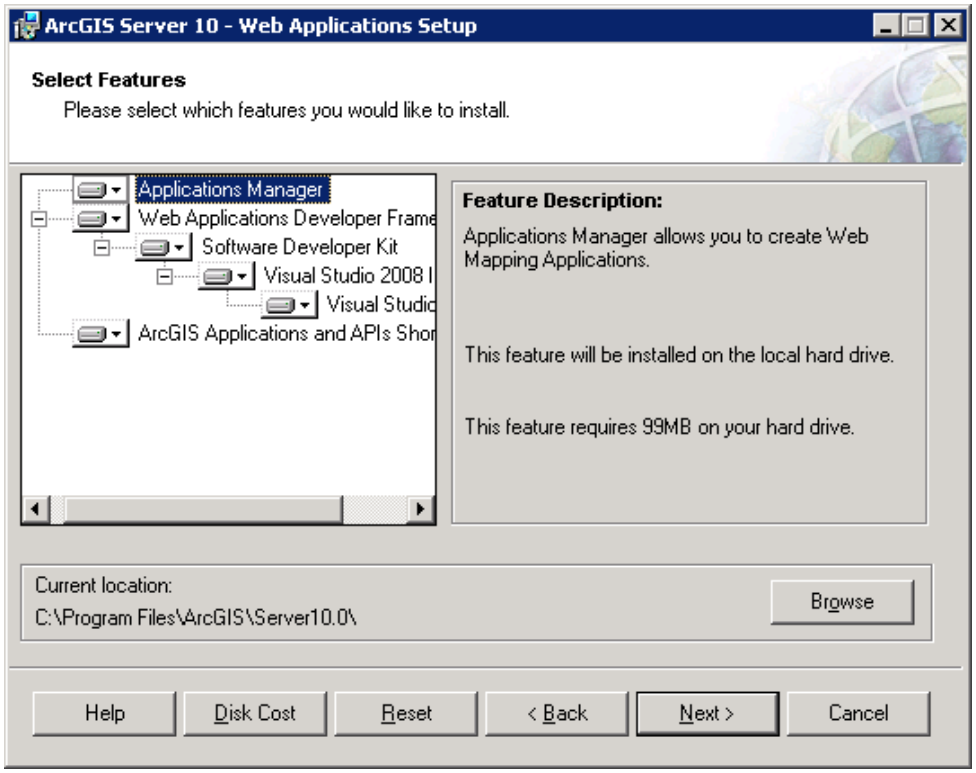
Microsoft Internet Explorer 7 or higher. You must obtain and install Internet Explorer 7 or higher prior to installing ArcGIS Server.

11.4.2 HOW TO INSTALL THE WEB APPLICATIONS SETUP PROGRAM

From the media front end, click the **Web Applications setup** link to launch the ArcGIS Server 10 for the Microsoft .NET Framework - Web Applications setup program.

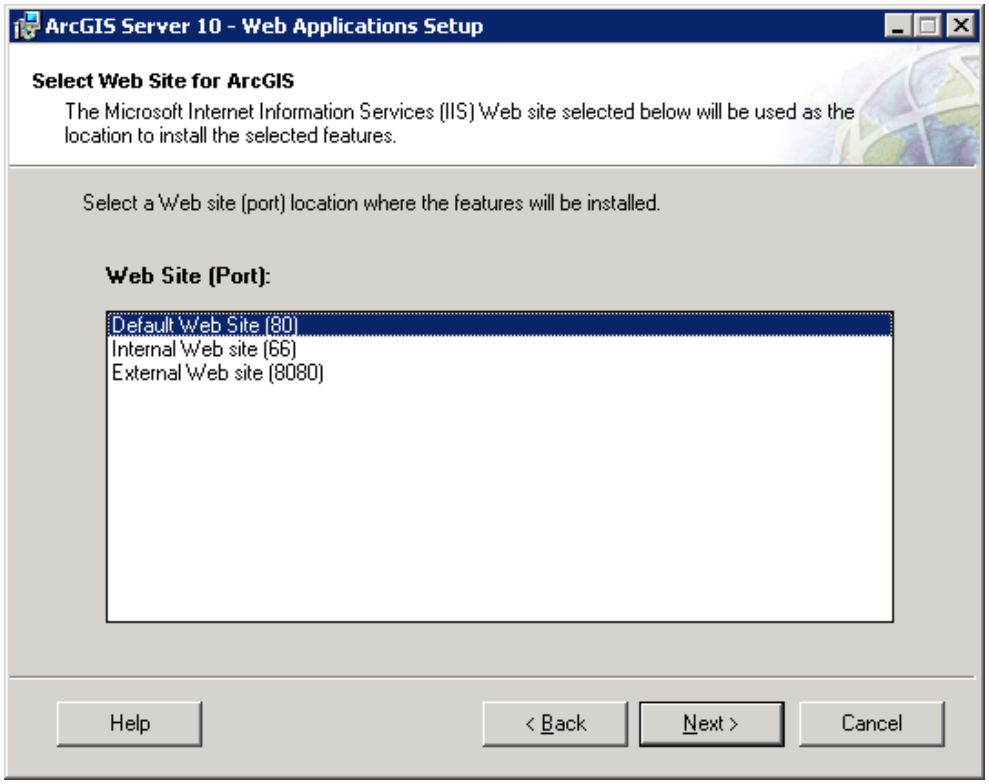
During the installation, read the license agreement and accept it, or exit if you don't agree with the terms.

The ArcGIS Server installation allows you to select the features you want.



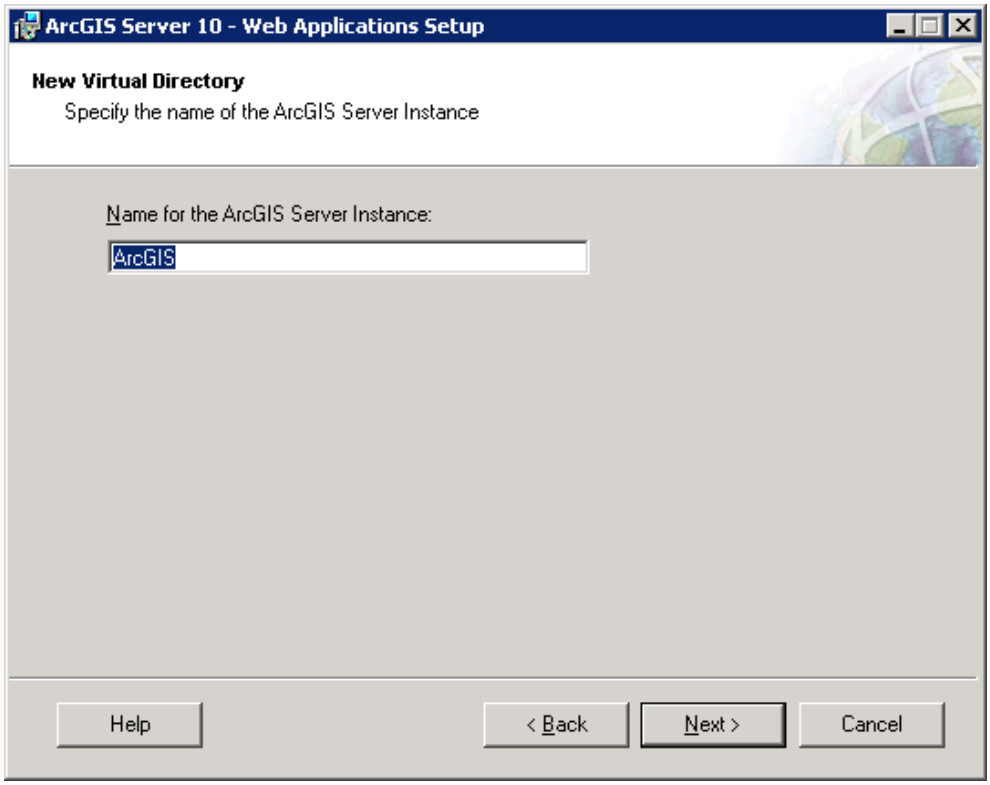
The ArcGIS Server 10 - Web Applications setup consists of a collection of features and subfeatures. An example of a feature is Web Applications Developer Framework, which consists of one subfeature, Software Developer Kit. Features consisting of subfeatures will have a plus (+) or minus (-) sign to their left. The plus sign will expand the feature so that you can view its subfeatures. The minus sign will collapse the list of subfeatures. To install other features, see Installing ArcGIS Server overview.

Select a Web site for the ArcGIS Server instance. Available Web sites are listed as <Web site name (port)>.


ArcGIS Server 10 - Web Applications Setup
Select Web Site for ArcGIS
The Microsoft Internet Information Services (IIS) Web site selected below will be used as the location to install the selected features.
Select a Web site (port) location where the features will be installed.
Web Site (Port):
Default Web Site (80)
Internal Web site (66)
External Web site (8080)
Help
< Back
Next >
Cancel

If you do not see the ***Select a Web site*** dialog box, this means you only have one Web site. If only one Web site is found on your machine, the ArcGIS Server instance is automatically placed on that Web site without displaying the Select a Web site dialog box.

Enter the name of the ArcGIS Server instance. The default value is ArcGIS.



Note:

If ArcGIS Server 10 - GIS Services is installed, you will not be given the option to configure the ArcGIS Server instance. Applications Manager will automatically install to the same instance created by the ArcGIS Server 10 - GIS Service installation process.